Cardiovascular Rehabilitation

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Preface

The idea of organizing a conference on cardiovascular rehabilitation evolved from discussions among physicians interested in cardiovascular disease and rehabilitation and the problems resulting from the increasing incidence of cardiovascular diseases in an aging population. The primary questions under consideration were:

1. What are the major problems facing the practicing physician in the management and rehabilitation of his patients with cardiovascular disease?
2. What are the major areas of current and future research in or related to cardiovascular rehabilitation?
3. What is required in the education of physicians, co-professional personnel, and the public in order to derive maximum benefit from our present resources and skills in cardiovascular rehabilitation?

In an attempt to answer these questions, a group of physicians participated in an informal conference that extended over a two-day period. The proceedings of a major portion of the meeting were stenotyped and are presented in this volume after editing. The chapter on research is a composite of views expressed at the meeting and in correspondence which followed the conference. For uniformity, these are combined in the form presented.

THE EDITORS

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Emotions and the Person with Cardiovascular Disease

Dr. White: Dr. Lee, would you please open the discussion on the psychosomatic implications for the person with cardiovascular disease?

Dr. Lee: Clinical observations of the effects of emotional stimuli on the cardiovascular system have been made since Galen (A.D. 130-200), when physicians noted the influence of the mind on the pulse. The advent of the twentieth century brought many technical advances in methodology, and with the development of sphygmomanometry, electrocardiography, x-rays, etc., it was natural that these be used in the study of the cardiovascular responses to emotional stress.

The cardiovascular responses which occur as a result of emotional stimuli may be classified as (1) those involving cardiac rate and rhythm; (2) those involving the vessels to localized areas, such as the skin, brain, heart, or kidney; (3) those involving the circulation as a whole; and (4) those affecting the physical characteristics of the blood.

The changes of cardiac rate or rhythm which occur with emotional stimuli may be any of the following. sinus bradycardia or tachycardia, sinus arrhythmia, atrial flutter or fibrillation, nodal

rhythm, ventricular premature beats, ventricular tachycardia, and possibly ventricular fibrillation.

There are a variety of changes in the vascular supply to localized areas, resulting from emotional stress. In the cutaneous arterioles, capillaries, or venules, vasoconstriction or dilatation may occur, and these are manifest by pallor, blushing, and urticaria. Raynaud's phenomenon and the initial phase of vascular headaches of the migraine type are the result of emotionally induced arteriolar constriction. Renal blood flow has been shown to be reduced by emotional stress, particularly when the stress results in systemic hypertension.

The general circulatory responses to emotional stress were studied extensively in animals by Walter Cannon. The cardiovascular changes observed included tachycardia, elevation of blood pressure, decreased peripheral resistance, visceral vasoconstriction, increased blood viscosity, and diminished blood coagulation time. These changes were similar to those which followed sympathetic nerve stimulation or the injection of epinephrine. In addition it was observed that stimulation resulted in *discharge of epinephrine from the adrenal gland. This reaction* was described as the response of "flight or fight."

Similar changes have been observed in man by a number of investigators. Wolff and his associates at New York Hospital have characterized these responses as follows:

1. Hypodynamic reaction pattern—a fall in peripheral resistance, no change or decreased cardiac output, occasionally bradycardia and collapse.
2. High output pattern—increased pulse rate and cardiac output, decreased peripheral resistance and perhaps a slight rise in blood pressure. This pattern is also observed after exercise or epinephrine injection and is similar to Cannon's "flight or fight" response.
3. High resistance pattern—increased blood pressure and increased peripheral resistance with little change in heart rate and often a decreased cardiac output. Norepinephrine produces similar changes following subcutaneous injection in man.

Most observers have noted these reactions as a nonspecific response to anxiety, with frequent occurrence of a mixed type of response rather than one which clearly fits one of the patterns described Wolff and his group have observed the high output pattern primarily when anxiety and conflict were overt and easily recognized, while the high resistance pattern predominated under circumstances of repressed anger, resentment, or anxiety.

The effects of emotional stress on persons with organic cardiovascular disease have been described many times since Heberden, in the classical description of angina pectoris, noted ". . . it will come by any disturbance of the mind." Rage and anxiety are the two emotional responses most likely to precipitate angina pectoris, but even happiness has been implicated on occasion.

In a study of patients with congestive heart failure admitted to the Cincinnati General Hospital, Chambers and his associates concluded that emotional reactions, particularly rejection, frustration, and rage, were important factors in the precipitation of congestive failure in 19 of 25 patients. Engel believes that emotional depression may be an important factor in the precipitation of heart failure. The fact that emotional depression may result in altered renal function with retention of sodium and water lends support to this impression.

Some evidence has recently been presented by Ecker and associates that "strokes" may be precipitated by emotional stress.

This phenomenon has been observed clinically As an example, a patient who displayed peculiar behavior at work for about a month finally was discharged as a result of aberrant conduct. Within 5 minutes of the time he was discharged the patient developed permanent hemiplegia. The mechanism by which this reaction occurs is unknown, although Ecker, using the technique of cerebral angiography, has postulated it is due to cerebral vascular spasm.

It is difficult to discuss emotional stress and cardiovascular disease without consideration of hypertensive cardiovascular disease There is no definite evidence that this is an emotionally induced disease, but it seems clear that emotional stress may exacerbate the hypertension and the symptoms of the disease.

The symptoms actually are those of anxiety and bear little relation to the level of blood pressure or the cause of the disease. Psychiatric management may relieve the symptoms but has no apparent effect on the natural history of the disease.

It appears that any patient with organic cardiovascular disease may demonstrate symptoms of the disease as a result of emotional stress. In some the symptoms are the result of the physiological alterations in cardiovascular function which have been described; in others they cannot be attributable to this but are the result of as yet undisclosed mechanisms.

Dr. White: Dr. Fisher, would you care to comment?

Dr. Fisher: As a continuation of Dr. Lee's remarks, there are two questions that arise: One is, how are emotions translated into physiological responses? Second, is there any definite evidence that the emotions can play a part in the pathogenesis of any of the cardiovascular diseases?

As to the first question, there are only two systemic channels through which this can occur. One is through the nervous system, and the other is through the endocrine system. In the field of neurophysiology, I shall briefly mention some of the recent advances: (1) the localization of areas in the cerebral cortex which exert a control over the autonomic nervous system; (2) the development of the understanding of mechanisms of the ascending reticular system of the brain stem and the relationship of this system to the problems of consciousness (since this system operates in the brain stem, where so many areas are connected with the function of the autonomic nervous system, it is apparent that any future developments in this area will have a bearing in establishing a link between perception, emotions, and physiological response); (3) the evolution of clearer understanding of the rhinencephalon (the so-called "limbic system"). There has been a great deal of work in this field, and I mention this for greater perspective of this problem. In the field of neurophysiology there have been extremely important advances in the past 10 years which promise a great deal for the future, both for psychiatry and somatic medicine.

In the field of endocrinology there are (1) the development by Selye of the adaptation theory, (2) the advances made as a result of the discovery of cortisone, (3) the recent clearer understanding of salt and water metabolism following the isolation of aldosterone, and (4) the improved biochemical techniques for the measurement of blood and urine levels of epinephrine and norepinephrine in human subjects.

As to the question of pathogenesis, to my knowledge there is no definitive work which establishes to any degree of satisfaction a connection between emotion and the cause of any of the cardiovascular diseases There are individual case reports, such as the one which Dr. Lee mentioned, and there have been many publications on psychoanalytical studies, in which a particular personality pattern or a specific emotional conflict has been labeled as the cause of hypertension, coronary occlusion, or cerebrovascular accidents. I think it can safely be stated that there is no clean-cut evidence which demonstrates that emotions cause these diseases.

Dr. White: I would like to mention the conclusions which I have reached in a very small number of patients who have heart disease due to a functional cause It has been mentioned that nervous tension and psychological reactions do not produce heart disease, but there is a small group of persons who have arrhythmias that are easily induced, though seemingly not originated, by neuropsychiatric disturbances. Arrhythmias may be attended by tachycardia for long intervals of time, as in the case of thyrotoxic patients before adequate treatment. I started my experience long enough ago to have seen thyrotoxic heart disease patients with uncontrolled thyrotoxicosis develop fibrillation and tachycardia, cardiac enlargement, and failure. This was due in part, at least, to the tachycardia and perhaps to other influences.

Another type, also rare, may be the occurrence of paroxysmal tachycardia of one type or another recurring frequently for years because of excessive nervous stimulation

Not infrequently, patients with varying degrees of coronary atherosclerosis will behave differently. In addition, with the same degree of atherosclerosis some patients will survive and others

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was defibrillated and a posterior wall infarction found. He survived Similarly patients on the medical wards who develop ventricular fibrillation can also be resuscitated I believe the most important part of rehabilitation is to have a live patient to rehabilitate.

Dr. White: I would like to add another method of resuscitation. Once I revived a patient who was apparently dead from a coronary occlusion by applying an ampule of aromatic ammonia to the nose. That is a pretty strong stimulant. That patient is still living years later. The heart as well as the respiration had stopped before application of the ammonia.

Dr. McDevitt, would you say a word about peripheral vascular disease?

Dr. McDevitt: Some years ago we were much interested in the effects of suggestion on the response to therapeutic procedures. I

block. After 6 weeks of treatment with wet towels and a machine that would light up but had no physical therapeutic effect, he was able to walk 40 blocks without leg pain At this point we discontinued the study, because he was beginning to develop angina pectoris.

We also observed an interesting reaction in a woman with Raynaud's phenomenon. On exposure to cold as low as 2 degrees below zero nothing happened People were beginning to doubt the diagnosis, until someone mentioned inadvertently that her husband was an invalid whom she had taken care of for many years Immediately her peripheral vessels went into spasm, and she developed the classical signs of this disorder.

Dr. White: Dr. Sprague, would you comment?

Dr. Sprague: There is just one point upon which I would like to comment. We must recognize the extraordinary specificity of angina at times. One may see an individual who can watch a boxing match on television without precipitating angina but who

die with an attack of angina pectoris, even though they do not have advanced atherosclerosis. Others who have a much higher degree of atherosclerosis can survive many attacks This is not based wholly on the extent of collateral circulation developed. There is a change in rhythm, either cardiac standstill or ventricular fibrillation, perhaps induced either by physical strain or by psychic influence. Sudden deaths may occur in individuals who hardly seem to have enough coronary insufficiency to warrant it. There have been reports of very rare cases of deaths due to fright in otherwise healthy persons.

I wonder if Dr. Levy would comment?

Dr. Levy: Of course, Dr. White, we know that many individuals die with advanced atheromata of the coronary vessels who have never had any symptoms. Others may have just one small attack and die suddenly. There is much we do not know with regard to basic causes. As a consequence, effective treatment and rehabilitation are difficult to carry out.

In applying any form of therapy, whether it be medical, physical, or psychiatric, we must recognize that in many forms of heart disease we are dealing, not with a fixed condition, but with a dynamic one which undergoes many variations. This is particularly true in coronary disease and rheumatic fever, since in these there may be either progression or regression.

Dr. Hellerstein: While it is nice to introduce the emotional reasons why some people die suddenly and others do not, a recent study indicated that 50 per cent of the patients who die of coronary artery disease die in cardiac standstill, while the remainder die in ventricular fibrillation.

Interestingly enough, those who die in either standstill or ventricular fibrillation can be resuscitated. Although the percentage is as yet unknown, ventricular fibrillation after occlusion can be defibrillated A physician who had just completed rounds at the University Hospital in Cleveland suddenly dropped dead. He was carried to the emergency room, about one hundred feet away, and instead of dying with his boots on, he was resuscitated with his clothes on. Through an immediate chest wall incision his heart

were abnormal, so that what these studies indicate is precocious disease, not a tendency to later development.

There is always a problem in evaluating any test procedure. A smoking test also involves an emotional response in the individual while he is smoking. We do not know what we are studying when a person smokes. To one person this may have quite a different significance than for another, so every one of these smoking tests is involved with emotional response.

The subject knows his response to smoking is being studied, and this may have an influence on physiological mechanisms. Dr. Wolff's people used ballistocardiographs some years ago and found that generally on Monday cardiac outputs were low, reached a peak on Wednesday and Thursday, and then began to fall off. There is an apparent week-end decline in the vital powers that is very striking, and the emotional interviews did change ballistocardiographic responses as well as systolic and diastolic pressures. This appears to be well recognized.

Dr. White: Would you want to comment on any other methods, for example, the use of the cardiac catheter?

Dr. Dock: The more you do to the patient before you test him, the less useful it is from the standpoint of effective psychosomatic influences. By the time the patient has had a catheter run down into his heart, his mood is disturbed by the procedure. Even putting him in a room where there is a gadget changes his mood. We all have seen simple-minded patients greatly improved by having an electrocardiogram taken. This was especially true in the old days when he had the buckets and foot basin. The patient went into the room with these gadgets with the wires in sight, was tested, and a few days later in the clinic he would say, "Couldn't you send me back to have another treatment?" The test itself affects the patient in all of the methods of study.

Dr. White: It is a very good idea to have that on the record. You don't suppose we could have any superimposed test in addition to the effects of what is being done, for instance, in the case of cardiac catheterization?

will develop angina if he watches a wrestling bout. Perhaps he projects himself into the role of the wrestler and not the boxer. One wonders if some of these variations in the trigger mechanism may not have psychic causation that we do not recognize.

Dr. White: One of the important aspects of the problem is that of attempting to determine by methods, or techniques, the effects of emotion on circulation. Dr. Dock, who has used the ballistocardiograph a good deal, may want to comment on this or other methods of study.

Dr. Dock: In the last issue of the *Annals of Internal Medicine,* there is a very interesting report by Dr. Thomas in Baltimore, who studied the medical students at Johns Hopkins with reference to family histories. Particular interest was given to the smoking response. Boys and girls, and not as many girls as boys, whose parents had hypertension tended to respond to smoking with a greater rise in blood pressure than a control group of students whose parents were not hypertensive. The children of people who had coronary disease without hypertension tended to respond to smoking with decrease in cardiac output as shown by ballistocardiographic curves. It is very striking that one group had children responding in one way and the other group had children with the reciprocal response.

In hypertensives, some people think this has something to do with the wiring diagram which you inherit. But most of us would not have thought that a tendency to develop coronary occlusion would be associated with a decrease in cardiac output on smoking. Dr. Thomas's material will have to be carefully studied, because these are average figures. We have been interested in the response to smoking, and we would like to know if the decrease in averages was due to striking changes in a few subjects. In our student body at State University of New York we have many students, with bad family histories, manifesting either hypertension or myocardial infarction, and we have detected early asymptomatic infarction in boys under the age of twenty-five. There are extremely bizarre responses to smoking in their ballistocardiographs. These are boys whose cholesterol patterns

Image and Appearance of the Human Body." In it he presented the concept that there is a body, a personality, and an external world both animate and inanimate To understand any individual due consideration must be taken of all of these three areas as well as their interrelationships.

In our approach to the individual with a disability we have adhered to this frame of reference. When a person becomes disabled, he is injured in all of these three areas. He is injured not only in his body, but he is injured in the area of his personality, as well as in the area of his relationships with the external world, both animate and inanimate, in other words his social relationships are injured. To understand the patient with his particular disability we must examine what this disability means to him in each of these areas.

On the rehabilitation service we see patients physically disabled and disfigured, and we find that these manifest disturbances in body image. We all have an image of a body. As a rule we are not aware of it, but when there is a disturbance of this image, we become aware of it. This image of the body plays a very important part in the total psychic structure of the individual. The person must then make a change, or alteration, or an adjustment to this change in his body image. Sometimes this can create a great degree of anxiety and depression. It will lead to a whole host of defensive maneuvers on the part of the individual, including one of complete denial of any change in the body image. For example, a person who has sustained cerebral infarction and has paralysis of his arm and his leg may behave and act as if there is no paralysis of these extremities. I think we are all familiar with this in the extreme form, but we should recognize that there are varying degrees of denial.

I think it is very important in our approach to such patients to be aware of whether this particular phenomenon, or defense, is operating This defense may be a very important one to the individual. We have seen patients where this particular defense has been brought to the individual in a very sudden and very abrupt way. For example, the patient who is hemiplegic and brought into an ambulation room where there is a full-length mirror in which he sees himself for the first time. We have noted

Dr. Dock: This is not the way to measure the effect of mood. Dr. Smith's people have observed the effect of mood on renal blood flow when the patient had a good many gadgets attached to him. It would appear this isn't an ideal way to study such physiological variables.

Dr. Benton: I agree with Dr. Dock. Having been a so-called "normal" subject in a catheterization study, I believe you would all agree with me that a man with a catheter threaded into his heart, a Cournand needle in his femoral artery, a continuous infusion running into his arm vein, a mouthpiece attached to a respirometer in his mouth, a catheter in his urethra, feet on the pedals of a bicycle, and lying on his back on a fluoroscope table in a darkened room, must be considered as being in somewhat other than a basal state!

Dr. Hellerstein: We have to recognize that every technique used in patient study has to be scrutinized, including ballistocardiography.

I think the new technique of radioelectrocardiography will make it possible to study cardiac function of people in action. This is important not only for line or bench jobs, but it may also be helpful in studying executives at desks or around conference tables. This is an apparatus the size of a pair of hearing aids which broadcasts electrocardiograms. In fact if necessary a sound system can be incorporated to pick up the words being spoken as well as respiration. The method allows heart action to be followed without having the patient connected to the conventional recording devices.

Dr. White: Dr. Fisher, would you open the discussion on the somatopsychic problems in patients with cardiovascular disease?

Dr. Fisher: I would like to present our frame of reference regarding the somatopsychic aspects of physical illness.

Some years ago there was a research professor of psychiatry at New York University named Dr. Paul Schilder. He was a very imaginative and creative person who wrote a book entitled "The

Image and Appearance of the Human Body." In it he presented the concept that there is a body, a personality, and an external world both animate and inanimate. To understand any individual due consideration must be taken of all of these three areas as well as their interrelationships.

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in this situation the precipitation of severe depression. In addition we have seen agitated depression and depressions which have come very close to psychotic depressions. These can be very serious.

The second area I wish to discuss is the personality of the individual. By this I mean the sum total of the ideas, the attitudes, the behavior patterns, the emotional patterns, the past experiences, and the organization of these by the individual. Everybody has a personality, and the particular disability will have a particular meaning to that individual depending on the past history of the individual, or, we might say in a more general way, the personality of the individual. For example, if as part of the development of the individual we have a problem in dependency, in assuming independent actions, in assuming a mature role in life, it is quite possible that the disability will produce the opposite reaction to the one we expect. Where we expect in a normal individual anxiety and depression, we may note a perfectly bland, accepting attitude. In this case the physical disability may play into or fortify certain basic needs of the individual. We must understand those needs if we are going to understand the total reaction of the individual to the disability.

One of the threats to the individual in the presence of an illness is the matter of regression. By this I mean that the individual is thrown back into a dependent state. There has been taken away from him the tools with which he has learned to function and from which he gains the self-esteem which is essential to his mental health. He is unable to work. He is removed from his familiar surroundings, his family, and his friends. I think the reaction of a patient to his first bowel movement after a heart attack, for example, illustrates why this is important. It is extremely important, because if the individual cannot function at a mature level in this particular area, he is reminded of the fact that he is actually treated like a child. He is thrust back into a childlike, or infantile, kind of situation, which may be very threatening to him.

We see this reaction very often in the paraplegic patient who has lost control of his bowel function. He suffers severe depression because he has regressed back to the anal stage of infantile

sexual development. Such patients attempt in a variety of ways to overcome this. One of the frequent ways is by an obsessive concern with control. Some of the patients become deeply preoccupied with this, and one of the reasons for this is that it serves as a means of controlling anxiety and depression in relation to the dysfunction.

As far as the external world is concerned with the individual's reaction to it, I think this is self-evident, but I would like to mention here the matter of work. There is a meaning of work to the individual. Of course, work has meaning over and above that of the economic connotation. It has a profound social meaning in terms of the status of the individual. It is one of the two major sources of self-esteem of the individual, work and his relationships with others—social relationships, family, or friends. These are the two major sources of self-esteem. Self-esteem can be conceived of as the psychological oxygen which is really the metabolic basis for mental health.

Our experience with patients who have had cerebrovascular accidents shows a tendency for them to be labile emotionally. We have found that there are two kinds of questions which will trigger an emotional reaction, usually of crying or weeping: First is a question about his family, his wife, and his children, and the other is a question about his past work or about his future work. I think this fortifies, in a way, the formulation of directions of thinking that we have developed in this area.

Considering the cardiovascular diseases within this particular framework, are there any special problems in specific diseases? For example heart disease, cerebrovascular disease, or essential hypertension?

Our particular experience has been with patients who have suffered cerebrovascular accidents. There are special problems here because we are dealing with an individual who has suffered brain damage. This poses unique problems, because such patients have sustained a disturbance in body structure and image. I think there are problems here which are different from those we see in the average patient with heart disease or the average patient with essential hypertension, unless these patients develop complications which produce physical neuromuscular disabilities.

There are many other problems in relationship to the patient with cerebrovascular disease, particularly those concerned with brain damage. Such patients have disturbances in memory, in judgment, and in personality which are quite marked. It has been postulated that these disturbances are on a purely organic basis because of destruction of brain tissue. It has been our feeling that there are disturbances in memory and in judgment on an organic basis, but the sort of change we see in the emotional behavior of such individuals we feel is not entirely explained on the basis solely of physical change in the brain. It has occurred to us as well as to others that, since the brain is the most highly valued and important organ in the body, one might say the integrative organ, the individuals who have sustained any kind of brain damage have an awareness of their deficit and suffer very seriously because of this.

The kind of changes we see, in the early stages particularly, in a brain-damaged individual are marked mood swings from hypomania to depression. These have been explained by some on the basis of disturbances in the physiology of the brain, particularly the midbrain and hypothalamus. It has been our feeling that these changes are the result of the awareness of damage and deficit on the part of the individual. He is struggling with depression and anxiety, and what we see is the summation of this kind of struggle.

As far as the hypertensive and the cardiac patient are concerned, it would seem to me that there are no disturbances in body image except for patients with severe deforming peripheral edema. For most patients this is a temporary phenomenon. For the hypertensive the problems are largely those of the psychological reaction to the disease and the problems of functioning—in other words, problems of anxiety and the problems of work.

As to the functional disorders, and here we refer to cardiac neuroses, which more precisely should be called cardiac manifestations in neurotic individuals, I can say only this: On the basis of the consensus in literature and on our own experience, we can be fairly sure that only certain kinds of personalities develop this kind of fixation on the heart. Such patients are ridden with anxiety, are very phobic, and give a history of having been phobic

and fearful individuals throughout the course of their lives. In the presence of anxiety, these individuals are very suggestible. It is possible that their fixations can be explained on the basis of conditioned-reflex phenomena. I think it is general experience that it is easier to establish a conditioned reflex in an individual who is in a state of anxiety than in a person who is not.

A second factor is that in the history of these individuals almost invariably one obtains a story of some significant person or some significant situation which is associated with a heart attack, a stroke, hypertension, or sudden death due to cardiovascular disease of any variety.

How does one manage such an individual, or is there danger of creating cardiac neuroses in individuals who have organic heart disease? Are we able to tell such patients the truth, and if we are truthful with these individuals, can we avoid these cardiac neuroses? I think we have to be circumspect, and we must deal with individuals as individuals. We must understand the person we are concerned with, and if we have a phobic individual, we have a person who has a fearful kind of personality structure. I think we must think twice before we tell such patients the absolute truth.

Further, if you tell such persons the truth, what effect does this have on their cardiac fixation? It is my experience that it has no effect whatsoever. I think such patients then become psychiatric problems and have to be dealt with on a psychiatric level.

Dr. White: Dr. McDevitt?

Dr. McDevitt: We occasionally see individuals with rheumatic heart disease, who have either peripheral or cerebral emboli, who have been told that nothing could be done for them. They have the impression that they may drop dead at any moment and that they must sit at home and wait for this to happen. Needless to say this approach often produces a severe cardiac neurosis. Although emboli may occur with or without therapy, there is no doubt that they are far less frequent after mitral commissurotomy and while patients are maintained on adequate amounts of anticoagulant.

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functional—in other words, we can not find any chemical or physiological disturbance or anything else to explain the phenomena that we are observing. It is perfectly true that, when you have a patient who has, say, severe anemia, or a coronary patient who because of lack of cardiac output develops disturbances in circulation to the brain and develops cerebral anoxia, you will get changes in that person's behavior and thinking and feeling, but from a psychiatric point of view we should be able to distinguish those from the patient with a functional, or nonorganic, disorder. A careful clinical evaluation will say this is a toxic psychosis, or there is an organic psychosis as opposed to, for example, a functional psychosis.

Dr. White: We need additional information from those dealing with the reaction of children, particularly as to whether psychic trauma or other such influences may precipitate rheumatic fever as has sometimes been suggested.

Dr. Wood: I think the only entity in which there is strong feeling that psychic or emotional factors can actually precipitate a rheumatic disease state is in Sydenham's chorea. Although the temporal relationship between streptococcal infection and the development of chorea has been demonstrated, there is evidence that emotional factors may play a part in the pathogenesis. Certainly in the aggravation of the symptoms of chorea, in the reaction of the child to his disease, and particularly in his adjustment to convalescence and life outside the hospital, emotional factors often play an important role.

The children we see at Irvington House come for the most part from the lowest economic level. Many of these children have parents or grandparents, uncles or aunts who have rheumatic heart disease, or who had such relatives who died as a result of rheumatic heart disease. These children constitute a special group who have a great deal of anxiety simply on the basis of having rheumatic fever at all They come to us with a preconceived idea of what happens to a patient who has rheumatic fever. To them rheumatic fever automatically means heart disease, progressive disability, and eventual death. It is very difficult to get this idea

I think it is a real mistake to tell patients nothing can be done for them. A positive approach early to prevent the development of a cardiac neurosis is far better than even intensive attempts to treat it after it has developed. This approach applies equally as well to people with cerebral vascular disease, as Dr. Rusk and his associates have so clearly shown.

Dr. Dock: I think we get into an awful mess if we begin to use *somatopsychic* for situations where the patient thinking about his illness develops a depression. This is quite different from going into a depression because of the lack of enough circulating thyroxin, which is somatopsychic in the pure sense in which I think the term should be used. We prefer to limit the term *somatopsychic* to situations in which something chemically wrong with the body acts upon the mind, just as we use *psychosomatic* for conditions in which something in the psyche acts chemically upon the body.

Dr. White: Don't you think there is more than the chemistry involved?

Dr. Dock: Many things. For instance, the cardiac who has cerebral anoxia. We have frequently seen patients with Cheyne-Stokes breathing who were psychotic, and after correction of their breathing for twenty-four hours, we had no more trouble with them on the ward. This I regard as somatopsychic disease.

Dr. White: That has been proved chemically, but there are other influences that have not yet been studied adequately.

Dr. Dock: No, but what Dr. Fisher is talking about, and equally important, is the disturbance to the psyche due to thinking about the trouble with his soma. This is what you meant mainly in your cardiacs?

Dr. Fisher: Yes. In psychiatry we see psychiatric disorders in two major groups: There are those which we consider to be organic and those which we consider at the present time to be

Dr. Franco: Speaking specifically of the coronary artery group, which is our big problem in our industry, we average about 100 to 120 acute coronary cases per year. Of these about 22 to 25 per cent die. Seventy per cent return to work, and from five to seven per cent are disabled and must be retired. The large proportion of these disabilities are due to the psychological reactions to heart disease. It is very rare to have a man unable to work because of progressive myocardial failure, or coronary insufficiency. It is interesting that people who have anxiety and depression about their heart disease are not able to work. As Dr. Fisher pointed out, a survey of their medical records almost always seems to indicate a basic personality defect. In other words, the heart disease itself has just triggered off something that may have been dormant for years.

Dr. White: Dr. Hellerstein has something to say on this problem.

Dr. Hellerstein: In our study of 1,075 patients in the Cardiac Work Classification Clinic in Cleveland and an almost equal number of patients who have come to University Hospital for possible heart surgery, certain aspects became very apparent which pertained to this problem of emotions and cardiovascular disease. I would like to construct the emotional problems into a mathematical formula. Three factors added together—(1) the pre-illness personality of the patient plus (2) the personality problems of the physician plus (3) the structural and functional consequences of the heart disease—equals the emotional status of the patient. I know the dangers of simplifying complex situations into a 1, 2, 3 form, but I think there is some value to this.

With reference to the pre-illness personality of the patients, we have been struck that there is a pre-illness personality particularly in the patient with coronary disease. I think it is pretty obvious that this is so particularly in the young coronary patient who is not only a somatotype but a chemotype as well I believe he is also a psychotype. In our studies we have been interested in this as part of the routine evaluation of the total patient. I think we can characterize this personality as being basically an insecure, very ambitious, and aggressive person. We have found

out of such children's minds. It takes very wise guidance and counseling on the part of the physicians in the first place. It also requires competent help from the psychiatrist and from social service workers.

A very anxious child who comes from a family where there has been a death from rheumatic heart disease can actually cause a kind of epidemic or moderate hysteria in a ward of children convalescing from rheumatic fever. The whole ward can take on a different aspect when one of these children is admitted. This is something that people working with convalescent rheumatic children have to be continually on the lookout for, because the hysteria can snowball and become an obstacle in any program of management.

Emotional problems may develop in certain patients following recovery from rheumatic fever because of restrictions placed on physical, social, or vocational activities. All too often the overprotective parent places restrictions on a child far in excess of those placed by even the conservative physician. This is a difficult problem to deal with, even when the situation is clearly explained to the parents and the child Here again, the psychiatrist and social service worker can be of great help in resolving such situations.

Prophylaxis to prevent streptococcal infection and reduce the recurrence of rheumatic fever creates certain social and emotional problems. It makes the children feel different. If they come to a special prophylaxis clinic, it reinforces this feeling, despite the fact that they are often quite normal in all respects except for the fact that they once had acute rheumatic fever.

I think the rehabilitation and psychological factors in rheumatic heart disease and in the management of children who have had rheumatic fever is in large part a public health problem. Currently this has much wider ramifications than the old-fashioned concept of public health, which was strictly epidemiology without consideration of a long-term follow-up of patients.

Dr. White: Would Dr. Franco say a word about the problems of industry relative to the emotional response of individuals to their disease?

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that there is even a difference between aortic- and mitral-valve diseased patients. We found there is a great degree of mesomorphy in patients with dominant aortic valve lesions. They have a personality make-up similar to the coronary patients, and we found them much more aggressive than the patients with mitral valve disease. Many of the patients who develop clinically significant coronary disease after thirty-five years of age have had a different type of personality, which I can characterize as being more passive.

In addition, the personality problems of the physician are very important and merit investigation. I now have accumulated many letters and have interviewed a large number of patients in studying why patients came for heart surgery. This seemed to reflect upon the personality problems of the physician, which in essence reflect upon the basic education of the doctor. Our associate dean at the medical school of Western Reserve University can discuss this at greater length, but let me say now that many physicians are basically insecure. Many of them need to dramatize the illness to the patient. Many are either excessively permissive or restrictive. There is the physician, then, who has to go into cultism; and we have some patients suffering from "Dock-ism." I mention this because of the restrictions placed upon them in terms of dietary intake, fat intake, cigarette smoking, coffee, and other such pleasures In a previous generation we found that the physician rigidly restricted all patients and put them to bed. Now there is a new type of cultism, which is to put him back into life but deprive him of fats, as well as a number of other things. I don't want to enter into this particular aspect of the validity of such regimens, but the excessive cultism in one form or another has to be evaluated. In terms of the emotional reaction, which is the summation of the factors, pre-illness personality, personality problems of the physician, and structural consequences of the heart disease, the problem of emotional reaction of the patient is important. For whatever the figures are worth, and I know that the Philadelphia group within published figures 2 or 3 per cent, in patients with heart disease the emotional reactions were as important as the basic heart disease. In our experience, the figures are 43 to 46 per cent of the patients. Obviously these facts

reflect upon the importance of the pre-illness personality of the patient and the personality problems of the physician.

In management of such patients we have found, as have others, that it is possible to release the constriction of the ego. To release the ego is to return the individual to a condition of adult life. We utilize many techniques to rehabilitate these individuals. The most important are interpretation and restoring them to remunerative work with status.

There is a great need for medical education of the patient, and this does not apply exclusively to cardiovascular disease, to give them a philosophy in the treatment of all disease, which is basically to recognize what the disease is and live with it as well as possible and to modify it if this can be done. I think there is need to study the pre-illness personality of the patient, assuming there is a pre-illness personality and a somatotype and chemotype. Instead of trying to rehabilitate patients, one should try prophylactically to habilitate them with the precoronary patient, the largest group. If we can select such patients, is there any value in prophylaxis for them?

Dr. Benton: It might be well to bring out at this point the problem of iatrogenic heart disease. Here psychological forces can increase the disability of the patient because of the influence of the insecure physician's advice and the recommendations to the patient. I presume Dr. Hellerstein may have had this in mind in his discussion.

Dr. White: We must go on, I think, but before we do there is just one type of heart disease that has not been mentioned. Perhaps somebody with experience with congenital cardiacs, with or without, of course, surgical rehabilitation, may say something. It might be worthwhile to hear from anybody with experience with congenital heart cases. Who will volunteer?

Dr. Stroud: I will.

We, in our Children's Heart Hospital in Philadelphia, have been in existence almost as long as Irvington House. A number of congenital heart cases have been admitted over the past 30

years which were erroneously diagnosed as having rheumatic heart disease. It seems to me, before surgery became practical in treating these cases, that most physicians were not really interested in a definitive diagnosis of the congenital lesion. Most of these youngsters were made introspective and apprehensive concerning their hearts. Usually they had mild congenital lesions which were never going to affect their cardiovascular efficiency or their length of life. I think the same thing holds with rheumatic heart disease in children. The physician must be careful *not to place fear in the minds of children with relatively* unimportant valvular lesions, and especially in the minds of parents The parents transmit this fear to the children, and they, in turn, become psychopathic cardiac cases.

There was a little girl of eleven who was told she had a heart murmur. Every time her mother asked her to wash the dishes she would grasp the left side of her chest and say she could not on account of her heart! I believe the rehabilitation of these individuals lies in a psychiatric approach to the parents and the youngsters. Reassurance that they can do all the things that other youngsters can do is true rehabilitation. This is really a psychiatric problem.

Dr. Levy: May I say a word about some of the other things that have been touched upon?

First about truth, for I think that this is an extremely important point in dealing with patients. I've always taken the attitude that it is best to tell the patient the truth, but not necessarily the whole truth. Under any circumstances do not lie, for, once caught, confidence in the physician is lost. How much truth to tell, how to present it, and when to speak forthrightly will vary according to the disposition of the patient. The family, I believe, should always know the facts. I have never had any sympathy with the view that the issue should be avoided. Not infrequently, it is striking how the same patient in the hands of different doctors can vary in his course. The approach allowing the greatest possible liberty within the realms of safety often converts misery into happiness.

2

Work and the Person with Cardiovascular Disease

Dr. Rusk: Dr. Morris, would you please open the discussion on item number two on our agenda, "Work and the Person with Cardiovascular Disease"?

Dr. Morris: My subject is the assessment of the physical and emotional demands of work. The demands or stresses of work on the individual accrue from the physical and emotional demands of work plus the stress imposed by the environmental conditions present when the work is performed.

The physical, emotional, and environmental stresses are additive. We know how to add the physical and environmental stress, but we do not yet know how to add the emotional stress to the two foregoing factors. As far as I know, we do not know how to quantify emotional stress.

The physical demands of work can be estimated by measuring the reaction of an individual to a specific job. We can measure the cardiac rate, blood pressure, respiratory rate, oxygen consumption, blood lactic acid, body temperature, electrocardiographic changes, etc., during work and recovery. Various differences in the response of normal persons and those with cardiovascular disease have been demonstrated. Some of these will undoubtedly be discussed later.

Another tool we might mention for the assessment of the demands of work is the Lauru force plate. Dr. Lucien Brouha of the Haskell Laboratories has used this to study the physical demands of work which may be below those causing changes in oxygen consumption above the resting level. For example, a typist typing the same text on a manual typewriter and an electric typewriter was found to require 50 per cent less effort when using the latter.

The cardiac catheter can be used to measure difference in pressure, blood flow, and cardiac work in response to certain levels of physical work, emotional stress, and environmental stress in the laboratories. Some of the difficulties inherent in this method have already been discussed by Dr. Dock.

The demands of work can be estimated without making any direct measurements on the individual. We can either add the metabolic cost of each of the component movements that make up a job, or we can calculate the amount of work done in terms of foot-pounds or kilogram-meters. It may be far simpler and just as adequate under certain conditions to use such methods rather than to assess the work load by measuring the various physiological parameters.

The value of energy-requirement figures should not be overstressed. For example, one might consider the actual case of a farmer with compensated cardiac disease who can do his corn planting quite well, but when he sees a cloud on the horizon that shows a storm coming, he develops cardiac symptoms. It is not because the energy requirements of the corn planting have changed. Furthermore, the energy requirements vary with the rate of work to a very considerable extent, as well as with the method of work. In the method of work all sorts of considerations enter. If a man is milking a cow, he may be milking a cow which is standing at the same level he is, in which case he would have to stoop, or he may have the cow standing up the height of this table, in which case he would not have to stoop. This will make a [illegible] is driving [illegible] a differen[illegible] at will presumably allow him to sit in a more relaxed way, and so

his energy requirements would be less for the particular task than the man sitting on a straight, hard tin pan.

I think we also have to accept the fact that the metabolic cost of work can be altered by the individual's attitude towards work. This is very hard to quantify, but if an individual hates the job, he apparently cannot relax and do the job with the same efficiency as that of a man who enjoys it. You may say that I am just clouding the issue and throwing it back to Dr. Fisher, but I cannot help it, I just have to tell you what I feel about this.

We suspect that certain tasks have a far greater effect on the cardiovascular-impaired patient than would be expected from their energy requirements. I remember when visiting Dr. Hellerstein in Cleveland we saw an accordion player who responded to a job requiring a very small amount of total energy with a very rapid cardiac rate. Perhaps straining at stool is another of the physical stresses which does not require a great deal of energy but which may be harmful to the person with cardiovascular disease.

We have found that much of the German research on the subject of industrial energy requirements is lacking in adequate descriptions of the job. I am sure that, if we had done the same work in this country, we would have noted similar shortcomings. This work was done in the 1930s by work physiologists without the help of industrial engineers, and it is of much less value because of this deficiency.

Perhaps I could discuss next the environmental stress. We know quite a lot about heat stress but very little about cold stress. Belding and Hatch at Pittsburgh and McCoggle in Britain have given us certain keys to the problem of estimating heat stress. The stress of any particular environment is based on the effect of that environment on the individual's capacity to sweat. Obviously if the environment is at a high temperature and humidity with little circulation of the air, the individual finds it much more difficult to lose heat through sweating than in a cool, dry environment with moving air currents Belding and Hatch have developed a heat-stress index based on these observations, and although the actual means of computation by these methods are not simple, various diagrams are available which make them a

routine type of computation. As with many indices, however, this index has been evolved through the study of physically fit normal young men. The next problem, obviously, is to see what is the difference between this type of index for a normal young man and those which could serve for an older man and for a patient with cardiovascular disease.

Cold stress is not so serious as heat stress, because the heat produced by physical work tends to counteract environmental stress in this case, whereas with a hot environment the stresses are additive.

I would like to finish with a brief reference to the question of fatigue. Fatigue is almost a dirty word. The physiologists, of course, have piled most of it into the psychologists' book, and the psychologists have taken the ball very bravely; but I do not think, beyond certain things like boredom, that they have really gotten very far with it. We do have this problem of boredom, as fatigue, in decreasing work performance. We also have a straight physiological fatigue, where we can say that one of the criteria would be that the energy cost per unit of work has increased. However, Brouha with the Lauru force platform demonstrated that, before one can detect any change in the energy cost of doing a given level of work, one can detect small changes in the musculature used to do that particular job. It follows nicely, although of course it may not be true, that, when the major muscle group gets tired, a subsidiary group comes into play to assist, and if the subsidiary group does not have a large enough volume by itself to affect by its own activity the energy requirement, then there will be no detectable change in energy requirement. Physiologists in the past have said that this is psychological.

Dr. Rusk: Thank you very much.

Dr. Hellerstein: Regarding Dr. Morris's comments about the assessments of the physical and emotional demands of work, it is very fine to work in a physiological laboratory, but the application, because we are dealing with people, still has to be an individual one. Interestingly enough, in American industry today, with the exception of foundry workers, longshoremen, and lum

berjacks, the majority of American workers are working at a level of 3 or 4 or less calories per minute. At such low level there is not a clear-cut relationship between pulse rate and oxygen consumption.

Similarly, with temperature effects and environmental effects in a study done in Scandinavia, the temperature was poorly controlled in the foundry and the average normal person had a pulse rate of 185 per minute These were well-trained people in the performance of accustomed work. This does not apply, however, to American industry today with the exception of a few backward foundries, the owners of which, however, are making provision to improve the environmental temperature control.

In estimating the physical demands or stresses of work I would say that the use of the pulse rate lacks validity. One can probably estimate what the general demands are, but as far as the individual cardiac worker is concerned, it is necessary to know how he works.

We have been interested in moving the laboratory out to the job, just as Dr. Morris has. We have studied people from a total approach, using the medical, social, and job-analysis approach, as well as studying them in a physiological laboratory. At present we are going out to study these people on the job.

Dr. Morris pointed out that jobs can be classified pretty well in terms of energy levels. As far as assessment goes, however, it is not enough to know the average energy requirement, one also must know what the peak loads are. In general, most of the jobs that are intolerable are so because of the peak loads, whether they be for only a few minutes or one half hour. The rest of the day most workers are coasting along at very low energy-expenditure levels.

There is much to be desired in terms of the excessive physical demands, because whatever the person's response is in the laboratory, one still can only know what he does by observing him on the job.

In a statement as to what can be done, I think it was mentioned that what can be done with comfort can be done with safety. This is not correct. What can be done with comfort by most people can be done with safety, but circulation can fail in many ways,

and pain or dyspnea are only two mechanisms showing failure of the circulation. I mention this because in our studies some patients have gotten into difficulties on the job while being observed. These are asymptomatic patients, but with conduction defects of a nonspecific variety. Interestingly, this has also occurred in the group of so-called "matched controls." This is a group of people who do not have heart disease but are of the same age, working on a machine for the same length of time as our cardiac patients who were under investigation. Therefore, what can be done with comfort can be done with safety in certain people but not in those who deny their illness or in those who have serious asymptomatic abnormalities with effort.

As far as the emotional demands are concerned, we have been surprised in our observations how difficult it is to assess what the person is going to do on the basis of his emotional expression. One of the supervisors we were studying was a florid, red-faced, slightly hypertensive person who, as the plant management and personnel physician pointed out, "blew his top" from time to time. He would go from one part of the plant to another and check on production in certain lines. In addition, he had to communicate with union stewards and other personnel who would be a source of aggravation to him. We recorded his blood pressure and electrocardiogram during his usual routine of work. While we were doing this, he did in fact "blow his top." We found only a slight bradycardia, which we considered insignificant.

We have found that in the same job there is actually more variation between individuals than there is between the same individual doing different jobs. In general, however, two people with the same general attitude will consume within 10 to 20 per cent of the same amount of oxygen on any given job. This is important, because the cardiac worker takes no more energy to do the job if he is well adjusted to the job than does the normal worker.

Boredom, the lack of challenge, repetition—these are factors that influence a person at work. Our patients are emotionally more at rest because they have gone through a work classification clinic. They have been reassured, their illnesses have been interpreted to them, and probably they are somewhat tran-

quilized in terms of their disease and life situations. This probably does not represent the typical person with heart disease on the job who has not benefited from a team approach.

Dr. Levy: I am very glad that Dr. Hellerstein negated the truth of this catchy phrase of what a patient can do with comfort he can do with safety, because it is not true and it is a poor rule. I will not take the time to go into the reasons for it.

Dr. Dock: I think this applies particularly to patients who during the day are not in discomfort, although they had retained salt and water, and at night are awakened by acute pulmonary edema

have no complaints during the day but who cannot sleep at night. The work they do in comfort may prove not to be safe.

Dr. M. Williams: In our discussion we should not forget to consider the many aspects of the patient's life in addition to the direct energy cost of his work. It is important to know the pace at which he works, his attitude, and the attitudes of those with whom he works. It is also important to know about his home life, problems relating to transportation to and from work, and the many other factors that may affect a cardiac patient.

Dr. Morris: I would certainly agree. In our assessment of the physical demands of work, if we are looking for an answer that will drop in an IBM punch card, we are bound to fail.

A good deal of work has already been done, particularly in Europe, by the work physiologists, and I think we should pay a good deal of attention to this work before we try to repeat it.

Dr. Hellerstein: The studies of work physiologists have been done with normal subjects. This is important, but we have to accumulate information about the cardiac I think we will find, however, that most cardiacs perform like normals.

Dr. Stewart: In answer to Dr. Williams's point about activities

off the job we did a few measurements off the job in our Lockheed study and found that activities such as mowing grass, swimming, and a few things like that required more energy than most of the jobs in the plant. It is also clear from a recent report by Passmore and Durnin in *Physiological Reviews* that many housewives' duties and recreational activities exceed many industrial jobs in terms of energy requirement.

Dr. Morris: Returning to work physiology for a moment: Here's a book by Lehmann ("Praktische Arbeits Physiologie") in which many studies are described which have been made at, or near, resting levels of oxygen consumption. The work physiologists were not, as Dr. Hellerstein pointed out, interested in cardiacs, but they have performed many basic and valuable studies. I think we should be cognizant of this material and pull the parameters for study from it rather than duplicate work that has already been done.

Dr. Hellerstein: In studying the physical demands of work, I think we should study both steady-state and peak loads. An important consideration on the job is that people don't work 6 or 8 hours at one pace. In our studies in an 8- or 8½-hour working day, most of the workers spent an hour or an hour and a half during the working day at basal levels, or so-called "basal levels." They came to work, had a coffee break at nine o'clock or a sandwich break, and measured oxygen consumption dropped. Then the lunch period, half an hour or 45 minutes of work, and then the afternoon break, and so it went.

We have clocked many persons on the job and have time and motion studies. For example, a given man worked 6 hours, 39 minutes. The rest of the time he was functioning at basal levels.

Dr. Lee: This matter of low energy requirements during work was shown in the studies by Passmore. In coal miners in Scotland he found that they spent 3 of their 8 working hours sitting, 3½ working, and 1½ walking. Actually they were inactive 38 per cent of their sojourn underground.

With reference to the problem of heat stress the studies of

Brouha have shown that the workers perform more productively and with less physical strain if they are given frequent rest periods in an air-conditioned environment.

Dr. Rusk: Dr. Stewart, would you tell us a little of the work that the Public Health Service has done in assessing the physical demands of various jobs which were performed by cardiac patients at the Lockheed plant in Burbank, California?

Dr. Stewart: In this study we attempted to answer three questions: (1) Can the oxygen consumption of workers on the job be used to assess the energy requirement of the job? (2) Do cardiac patients and noncardiac subjects working on the same job require the same amount of energy to do the job? (3) Is it possible to develop a physiological profile for cardiac workers?

To answer the first question, a number of variables were studied. For instance: Do workers differ between themselves in the energy they require to do the same job? Does a worker differ with himself in different periods of time during the day? Are there variations among days? If there had been a great variation between individuals doing the same job, we would have had to test so many individuals in order to get an average energy requirement for that job that we would not be able to do the study. We found that the biggest variation was between workers doing the same job, but that did not vary enough, and we could assess the energy requirements of certain jobs on the basis of oxygen consumption. We did run into some jobs which demonstrated wide variations in oxygen requirements. In these jobs we usually found a number of activities, such as sitting, using a screwdriver, riveting, climbing up tall ladders, etc., involved in a single job. Sometimes the energy requirement was very low in such a job; sometimes it was quite high. We made a check list of the jobs, and the job analyst estimated the energy required for each job. Usually this estimate agreed fairly closely with the oxygen-consumption measurements.

The next phase of our study plan was: Do cardiacs and noncardiacs working on the same job use about the same amount of energy? On the job cardiac patients were class I and II, with the

larger share having coronary artery disease. They all reported that they were working comfortably on the job. We found they used about the same amount of oxygen to do the same job as did the normal subject. We did find, however, that the peak load was lower for the cardiac than for the noncardiac. We do not have any real explanation, except that we think that perhaps the cardiac guards himself when he is approaching peak levels. We also found that oxygen debt was greater in cardiacs than in noncardiacs doing the same job.

We took these same individuals, both cardiac patients and noncardiac subjects, to the laboratory and exercised them on a treadmill, walking at 1.7 miles per hour on a 10 per cent grade for 10 minutes. A large number of physiological measurements were made. All the noncardiac subjects went through this test, and of the cardiac patient, 13 of a total of 42 could not complete the test. Most of the 13 dropped out before 5 minutes. I believe the time was somewhere around 3 minutes. The quitting was on the basis of symptoms such as fatigue, dyspnea, or pain. Despite the fact that they couldn't finish the test, they all performed satisfactorily on the job. It would appear that the treadmill test was harder than any job at Lockheed, since it required a higher energy level. In addition, as on the job, the peak levels were lower for the cardiacs, and the oxygen debt was significantly higher in the cardiacs than in the noncardiacs. In cardiac patients who did not finish the job, the debt was very high. In addition, the oxygen consumption by these individuals was lower than the normals during the period they were actually walking on the treadmill.

In this same group of cardiac patients, the recovery time, which is the time required for oxygen consumption to reach the resting level after cessation of work, was longer than for the noncardiac.

The third phase of this study was to perform a battery of physiological tests including those already mentioned, with a view to giving us a useful physiological profile of the cardiac worker. I cannot tell you the results of this study; we are still working on these data, but I do not know whether we are going to be able to tell anything from this or not.

Dr. Gerber: If you had performed the treadmill test first, would

the tendency have been to exclude those cardiacs who were unable to finish the test or who finished it poorly from the jobs which they were, in fact, able to do comfortably?

Dr. Stewart: No. You see, the way the study was performed was to select working cardiac patients who volunteered. You must remember one thing: We could not find any cardiac workers on the hard jobs in Lockheed. These subjects came from the lower-energy jobs. We do not know if this is because, as one gets older, there is a tendency to gravitate into lower-energy jobs, or whether the patients have found this themselves because of their cardiac condition. We did find, even though a person told us he was comfortable on the job, we had to be very careful, because we discovered a few individuals with nocturnal dyspnea who did not tell us. They worked all day and sat up all night. Another point of interest was the instance of a man who worked at a certain level, but in every 5 or 10 minutes of an hour he had to work at three or four times that level. Actually, this is what our treadmill test was. It was a peak level for 10 minutes which eliminated some men. They may have been working at jobs that required 2 minutes of that kind of level of energy expenditure.

Dr. Rusk: Dr. Hellerstein, would you tell us of some of the studies which you have been doing in Cleveland on this problem of the response of normal subjects and cardiac patients to work stress.

Dr. Hellerstein: We have no single satisfactory test for cardiac function. We must use a variety of tests, because failure of the cardiovascular system can take place in terms of failure of heart muscle, coronary flow, valve function, cardiac rhythm, repolarization, and so forth. One of the methods which we have had under investigation recently has been the treadmill test of Bruce. From the results of this test Bruce derives a numerical fitness index which has been found to be low in cardiac patients. The formula for this physical-fitness index is as follows:

$$\frac{\text{Duration of exercise} \times \text{respiratory efficiency} \times 100}{\text{cumulative heart rate for the first 3 minutes of recovery}}$$

According to Bruce's most recent article in *Modern Concepts of Cardiovascular Disease*, values for normal subjects range from 13 to 26. Cardiac patients in functional classes I and II average 13 to 17, while those in class III average about 9, with those in class IV as low as 2.

We have used Bruce's test but have not been satisfied with it, because it does not include the multiple parameters of cardiac function needed for a complete evaluation. This is particularly true of the electrocardiographic abnormalities which may occur with exercise.

In addition to the factors already mentioned there is the important factor of motivation. The person who does not fulfill the test may be poorly motivated, have a different pain or dyspnea threshold. Unfortunately these subjective reactions are not easily quantitated objectively.

Using Bruce's treadmill and step tests we found certain differences between normal subjects and cardiacs. All normal subjects had an increased respiratory efficiency (the amount of oxygen extracted from the air inspired always increased). The cardiacs also had an increased respiratory efficiency but it was generally less than the normal subject. The respiratory rate increased equally in both groups. In the normals the heart rate did not go above 125, the oxygen debt was about 10 per cent, and the physical-fitness index varied from 13 to 22.

We found, if we took the amount of oxygen consumed per minute and divided it by the number of heart beats per minute, that there was a good correlation with the physical-fitness index. In all cases with a fitness index below 10 the oxygen transport was less than 6. For example, if a person consumed 1200 cubic centimeters of oxygen per minute at the height of exercise, and if he had a heart rate of 120 beats per minute, each beat was effectively being concerned with the uptake of 10 cubic centimeters of oxygen. If the cardiac output was low, the oxygen transport per beat was low.

As far as the maximum breathing capacity and the vital capacity were concerned, there was no correlation with the physical-fitness index. There was poor correlation of the resting ballistocardiogram and abnormal fitness indices.

Because we were dissatisfied with the treadmill test as a practical work unit, we decided to reevaluate Master's original exercise test. When Master and Oppenheimer devised the test, they did not devise it on the basis of the electrocardiographic response. It was actually devised as a test in which the number of steps was determined that persons of different age and weight could make and still have a return of pulse rate and of systolic and diastolic blood pressure to within 10 points of original control levels. They observed the recovery rate and blood pressure throughout the study.

We decided we would do more than that, because we were interested in the ergometry of the work We believed this test would be an excellent assessment of the peak load.

The observations made in this study included measurement of height and weight, examination 2 hours postprandial, resting ballistocardiogram on a Starr table, 12-lead electrocardiogram at rest and after exercise, oxygen and CO_2 content of expired air, oxygen consumption, cardiac output with radioactive iodinated albumin, and frequent measurement of blood pressure. The exercise carried out was as originally described by Master and Oppenheimer, and the time of exercise was 1½ minutes.

The patients were seated until they reached a steady state in terms of pulse rate. A 12-lead electrocardiogram was taken and cardiac output measured. We took a 5-minute sample of expired air, the subject was instructed to stand, and the test was performed. The exercises were performed in the standard time of 1½ minutes. During exercise the total air sample was collected, and a continuous electrocardiograph was recorded. Two minutes after the completion of the exercise, blood pressure and pulse rate were noted with recordings at intervals thereafter. The expired air during recovery was collected as seven samples. The first was 1½ minutes after completion of exercise and the remainder at 2-minute intervals. The air samples were analyzed with Haldane gas analyzers The volume was measured and corrected to standard conditions. The second electrocardiogram was taken 5 minutes after completion of exercise, with a third one 5 minutes later.

We studied 126 normal people and 71 people with heart disease.

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some importance possibly because in a peak exercise it would seem that an older person does not mobilize his cardiovascular system as readily as a younger person.

The cost of exercise in normal people was about equally distributed between the exercise and recovery period. The amount of oxygen consumed during exercise and during recovery was 1,185 to 1,105 cubic centimeters. The increased oxygen consumption during exercise in the normal was the product of an increase in ventilation to 2 3 times and of oxygen extraction to 1.6 times resting levels In other words, the normal person consumed more oxygen by breathing 2 3 times more volume and extracting 1.6 times more oxygen.

We found that the rate of work showed a significant reduction in each decade above forty as was indicated by the test. The amount of oxygen consumed was not less, but the amount of work that was prescribed and performed was less. Therefore, if the concept of mechanical efficiency were to be considered, it was a bit lower in the older subjects.

To compare the normals with the arteriosclerotic cardiac patients of the same age group, we took all those cases forty years or older of the coronary group and found the ages of these two similar groups averaged forty-eight and forty-nine years The weights were 77.3 and 77.4 kilograms, plus or minus standard deviations; duration of exercise, 1 55 and 1 57 minutes, respectively. Thus, these groups were strikingly equal.

The ventilation per minute was the same in both groups. The oxygen extraction was the same for each group, and the oxygen consumption was the same. During exercise, however, there were two significant differences:

1. Oxygen utilization of the cardiac coronary group was significantly lower during exercise. This really separated the cardiac from the noncardiac. In the normals this rose from 3.1 to 5.01 and in the cardiacs from 2.98 to 4.5.

2. Oxygen debt was slightly greater in the cardiac group, and the ratio of oxygen consumed during exercise to oxygen consumed after exercise in normals was 1.06 and in the arteriosclerotic group was 1.75. This is significant with a P factor of 0.71. In this group one could separate more consistently the cardiac

The 126 normals had no history of heart disease and were free of signs of heart disease on physical examination. We eliminated 41 of the 126 people from the control group These were people who live an active, full life. We excluded them because five of them, for example, had hypertension at rest. Nine subjects had abnormal electrocardiographic responses to exercise, ten subjects had abnormal responses of blood pressure to exercise. There were 17 subjects with abnormal electrocardiographs and blood pressure responses and hypertension at rest. This left a group of 85 people free from cardiovascular disease or dysfunction by these strict criteria. We had, therefore, two groups of normal control subjects. We had 20 people in each decade from twenty to sixty and 5 subjects in the seventh decade. We became quite discouraged, because it was hard to find normal people who fulfilled these criteria of normalcy. We used 5 subjects in the seventh decade even though they did have one abnormality, which was an abnormal blood pressure response to exercise. We used them because we could not find normal people in the seventh decade who fulfilled all these rigid criteria.

The persons we studied with heart disease were those in attendance at the Work Classification Clinic, all ambulatory, all working, all active and none had been confined to bed within the past several months. This is important, because they were in the average state of activity.

Of the group with cardiovascular disease, 43 had arteriosclerotic *heart disease and the remainder had hypertension.* According to the functional and therapeutic classification of the New York Heart Association the patients with arteriosclerotic heart disease were: IA, B, or C9; IIB or C27; IIIC6. Most of these individuals fell within the forty- to sixty-year age range. All the subjects, both normal and cardiac, were able to finish the test.

The energy requirement of the exercise was equivalent to 6 8 times the resting level of oxygen consumption. This did not vary significantly with age, weight, or disease state. We found, however, that mechanical efficiency in normal subjects was lower in the older age groups. The amount of oxygen consumed at all ages was about equal, but the amount of work performed, that is, the number of steps taken, was less in the older people. This is of

who has to make a decision regarding the patient's ability to work.

At Bellevue we used many techniques. In 1941 the old Schneider index was explored, which was of no value whatsoever. In addition, we used ear oximeter studies and Master's two-step test with no significant aid from either. Sometime later, Dr. Eichna did studies of oxygen debt which also weren't helpful in giving a patient advice about returning to a specific type of work. Recently we have attempted to apply the step test of Bruce to the evaluation of patients with cardiovascular disease. (In this test the patient steps up and down on an 8- to 9-inch step 20 times per minute for 10 minutes. This is supposed to approximate the treadmill test and is equivalent to a task which increases oxygen consumption to four times the resting level.) Precordial lead electrocardiograms are taken as in the treadmill test, and the respiratory rate is recorded. The patient sits for 4 minutes, stands for 1 minute, and exercises for 10 minutes, and then sits for 5 minutes. The formula for physical-fitness index is

$$\mathrm{PFI} = \frac{E(k')}{(r)(c)} \times \frac{s}{20}$$

where E = endurance
k' = 100 × 100 or 10,000
r = average respiratory rate during exercise
s = average number of steps per minute
c = cumulative heart rate for first 3 minutes of recovery

In this test Bruce substituted the step for the treadmill and 100 divided by the average respiratory rate for the respiratory efficiency, otherwise it is much like the PFI for the treadmill test.

We had hoped that this would be a practical test which could be performed in the physician's office and which would help him in estimating the work capacity of his patients.

Before we applied the test to patients, we had the physicians in the clinic at Beekman-Downtown Hospital try it. We found that the test was too strenuous for even a group of so-called "normal" middle-aged noncardiac males. This may have been a reflection on the poor general physical fitness of the physicians, but because of these initial results we shortened the test to 5

from the noncardiac. Four per cent of the normal group had an abnormal response, and thirty per cent of the cardiac group were abnormal. This is a very significant difference.

As far as blood pressure response alone goes, 65 per cent of the arteriosclerotic, 65 per cent of the hypertensive, and 50 per cent of the rheumatics had abnormal blood pressure response. As far as electrocardiographic response is concerned, *the electrocardiogram was abnormal in 33 to 40 per cent of the cardiac group and in 7 per cent of the general normal group. Thus, the electrocardiogram was not specific for the coronary patient.*

We found there was no correlation between an abnormal resting ballistocardiogram and an abnormal physiological response to exercise. We used the Starr table in this phase of the study. The ballistocardiograms were taken at rest, and the physiological studies were done at rest, during exercise, and after exercise. It is possible that a ballistocardiogram after exercise would show a *better correlation.*

Dr. Benton: I am interested to learn that both Dr. Stewart and Dr. Hellerstein corroborated our findings of 3 years ago when we reported that the cardiac patient and the noncardiac subject did not differ greatly in energy expenditure for the performance of familiar activities of daily living and of occupation, providing the cardiac reserve was not exceeded.

C[illegible] [illegible]rther finding that [illegible] is 28 times above [illegible] cardiac patients for short periods of time. This has great interest, since the industrial engineers consider work at a level of eight times above the basal rate to be strenuous and few jobs in American industry demand *this for other than very short bursts of activity in the* heaviest type of work.

Dr. Bronstein: I have always been interested in some type of procedure which could be used in the average clinic, doctor's office, or industrial establishment, not from the standpoint of coming up with a definitive diagnosis, but merely from the standpoint of giving some additional information to the physician

who has to make a decision regarding the patient's ability to work.

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minutes. We tried to match the cardiac patients to be studied with a comparable group of controls. All were males; age and weight ranges were about equal in the two groups. The controls were examined and were free of clinical evidence of cardiovascular disease. The majority of cardiac patients had hypertension and/or arteriosclerotic heart disease, and most were classified IIB or IIC by the New York Heart Association's criteria.

The data on both patients and controls were reviewed by Dr. Fertig of the biostatistics department at Columbia. He found that the reciprocal of the respiratory rate made very little difference as far as the formula was concerned. We have not completed our analysis of the remainder of the data, but there appears to be some difference in the postexercise pulse rates, which may aid in the evaluation of the cardiac patients. There was, however, in our results a good deal of overlap between the cardiac and the normal groups.

The most practical aspect of this test was as a double check on the physician and the patient. We found that when a patient had a poor index and we had thought he had a reasonable work capacity, a careful review showed that the patient was often far more limited than he was originally willing to admit.

Dr. M. Williams: What we want is something to measure that will separate the cardiac patients from the normals. I don't think this step test is the answer.

Dr. Hellerstein: The test is inadequately formed.

Dr. Bronstein: As far as it is now, the test is not a complete test. We wanted to see what would happen with it.

Dr. Hellerstein: Sansetta in Cleveland is doing a mild exercise that increases the oxygen consumption about 1½ times. He thinks he can find differences between normals and abnormals using cardiac catheterization. He does a good many studies, including coronary blood flow, which are not practical for our patient population.

The main criticism of the Master's test which I described

is that the energy requirement is too high. If anything, there is a need for a test that will distinguish between the cardiacs and normals at a lower level.

Since we are working with ergometry, the real question is: Can the cardiovascular system get the required oxygen to the tissues whether it is under a high or low pressure, a high central venous pressure or not, with a low or high oxygen extraction? Basically the heart is still trying to support the oxygen system. This is what we are trying to find out. Cardiac dysfunction can be shown by making these various measurements. I do not believe, however, that this gives us all the information needed, because we have to have one more bit of information: What does the job require, and what are the variations on the job? The tests can indicate what the person can do in terms of an energy load but not what he would do in terms of a job situation.

Dr. Rusk: Dr. Hellerstein has said these tests can indicate what the person can do in terms of energy load but not what he could do in terms of a specific job situation. Dr. Greer, who is medical director at the Gillette Safety Razor Company in Boston, has been studying the problem of the cardiac patient at work, and I wonder if he would tell us what he has found.

Dr. Greer: Under proper job placement and satisfactory mental and emotional states the prognosis of the worker with degenerative heart disease who returns to productive employment is equal to, or better than, that of the worker who ceases work immediately upon diagnosis or recognition of his cardiac disability. Follow-up studies of cardiac patients in industry should reveal a favorable experience, in so far as efficiency, absenteeism, accidents, and the need for special considerations are concerned.

In viewing the problem of the cardiac worker the attitude of management must be considered It is medically and socially idealistic to believe that industrial plants should serve as actual rehabilitation centers. Industry is competitive, and unless adequate productivity can be established and maintained, a plant will not survive. In addition, never have people been so "claim-conscious." Present compensation laws with regard to aggravation

of preexisting disease or injury are such that it is necessary to protect the employer.

Working capacity rests upon careful clinical evaluation of circulatory function and emotional capabilities of the employee in relation to the requirements of the job to which he is to be assigned. The worker must be acquainted with the structural and functional aspects of his disease process, and the appropriate health counseling for maintenance of optimal health must be accomplished in order to maintain the patient in a state of maximum function.

The patient's attitude and motivation toward work are important factors. Some may approach the return to work with dangerous disdain, others may give wholesome and intelligent cooperation, and still others may develop a cardiac neurosis. Here is the physician's golden opportunity to indoctrinate the patient and to teach him how to live fully with his heart disease. As a rule there is little need to change the patient's occupation. If a change in job is required, the factors of prestige, salary scaling, [illegible] ed in [illegible] may [illegible] may be acceptable, but it may also add to the emotional insult that has already been sustained. One must also recognize management's problem with the increased numbers of employees with cardiovascular disease. A critical situation can be created with too many candidates for too few so-called "light-work" jobs.

In the reemployment of workers after a recent cardiac insult a number of factors are implicated:

1. From the patient's standpoint
   a. What are his physical and mental capabilities?
   b. Will he aggravate his disease process as a result of work?
   c. Will the failure to be rehired do as much to aggravate a progressive disease as returning to previous labors?
2. From the standpoint of management
   a. Will he endanger the safety of fellow employees?
   b. Will he produce at a profit?
   c. Is his worth in experience sufficient to justify reemployment regardless of compensation possibiliti

d. What is the morale effect on other employees with regard to the ultimate decision?

It may be worthwhile to present at this time a pilot study made in one plant of about three thousand employees. This industry work is light to moderate in nature and composed mostly of either machine operation or exacting work where concentration is imperative. We have had the good fortune of working with an enlightened and liberal management with whose permission extensive clinical observations have been carried out. Complete physical surveys comparable to the so-called "executive examinations" are offered to all employees on a voluntary basis. The response has enabled us to carry out a number of studies, by virtue of the fact that the plant population is closely associated with the medical department for 8 hours of the day.

The number of patients with different categories of cardiovascular disease among the active employees examined is as follows:

Table 1

Essential hypertension	102
Arteriosclerotic heart disease	49
Rheumatic heart disease	29
Hypertensive cardiovascular disease	27
Abnormal electrocardiograms only	26
Congenital heart disease	3
Total	236

Approximately 12 per cent of the examined employees have evidence of cardiovascular disease. This is about average for any carefully screened group of individuals of comparable age range and sex.

There are 29 employees working with a history of coronary thrombosis. Eight of these are in management, twelve are skilled labor, and nine are in the unskilled group. The incidence of angina pectoris of varying degree is 100 per cent in the management group, 75 per cent in the skilled group, and 90 per cent in the unskilled group. All of these employees are productive. Five of these employees have had two and three have had three known coronary thromboses. The survival in years following coronary thrombosis is as follows:

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in percentage of total cases and the percentage of total days lost, and is about equal to absenteeism due to neuroses in these respects.

In 1954 the incidence of absenteeism in relation to medical-department visits for cardiovascular disease was 6.3 per cent. In 1955 this figure dropped to 3 2 per cent. Our data indicate that for all diseases the more medical-department visits, the lower the absenteeism rate.

Table 3 analyzes absenteeism in the plant population for 1955 with regard to employees with specific cardiac disease as compared to the healthy employees:

Table 3

	Average days lost per year per employee
Average employee	11.4
Male	8.9
Female	15 3
Arteriosclerotic heart disease	22.1
Rheumatic heart disease	14.5
Hypertension	11.9

This demonstrates a favorable comparison for the workers with cardiac disease.

In the problem of cardiac rehabilitation the work performance of the employee is of great importance.

Table 4 represents the work performance record of 96 cardiac workers:

Table 4. Work Performance Rating

	Base, %	*Regular, %*	*Premium, %*	*Unsatisfactory, %*
Total plant population (approximately 3,000 employees)		50	20	
Arteriosclerotic heart disease (47 employees)	1 5	48	30	4
Rheumatic heart disease (24 employees)	4	46	30	4
Hypertensive heart disease (25 employees)	4	48	20	

1 to 3 years	9	5 to 10 years	8
3 to 5 years	8	10 to 15 years	4

The age group of these individuals is as follows:

31 to 40 years	3	51 to 60 years	11
45 to 50 years	7	61 to 65 years	8

It is of interest to note that approximately 30 per cent of the total deaths in the employees working for the past 4 years has been due to arteriosclerotic heart disease. In individuals who have retired the percentage of deaths due to arteriosclerotic heart disease was about 28 per cent.

A most important observation is that many of the employees with angina pectoris have fewer episodes while at work than at home. In many cases the old adage that exercise is good for the mind as well as the body holds true. Others have remarked that they feel greater security while at work because of the presence of an adequately staffed medical department.

Absenteeism in cardiac employees is one of the causes of concern on the part of management. Our experience has been of interest: 8.4 per cent of the total plant employees have long-term absences (over 2 weeks), representing some 12,000 days lost per year. Table 2 represents systemic causes of long-term absenteeism from 1952 to 1956.

Table 2. Long-term Absenteeism, 1952 to 1956

	Per cent of absenteeism cases	*Per cent of total days lost*	*Average duration of lost time per case (weeks)*
Musculoskeletal system	18.5	18.5	7.6
Respiratory system	20.0	14.5	4.8
Female reproductive system	8.6	11.5	7.9
Cardiovascular system	8.7	9.0	8.1
Neuroses	6.7	8.5	8.5

Of the five major causes of absenteeism, diseases of the cardiovascular system rate fourth after diseases of the musculoskeletal system, respiratory system, and female reproductive system, both

in percentage of total cases and the percentage of total days lost, and is about equal to absenteeism due to neuroses in these respects.

In 1954 the incidence of absenteeism in relation to medical-department visits for cardiovascular disease was 6.3 per cent. In 1955 this figure dropped to 3.2 per cent. Our data indicate that for all diseases the more medical-department visits, the lower the absenteeism rate.

Table 3 analyzes absenteeism in the plant population for 1955 with regard to employees with specific cardiac disease as compared to the healthy employees:

Table 3

	Average days lost per year per employee
Average employee	11.4
Male	8.9
Female	15.3
Arteriosclerotic heart disease	22.1
Rheumatic heart disease	14.5
Hypertension	11.9

This demonstrates a favorable comparison for the workers with cardiac disease.

In the problem of cardiac rehabilitation the work performance of the employee is of great importance.

Table 4 represents the work performance record of 96 cardiac workers:

Table 4. Work Performance Rating

	Base, %	*Regular,* %	*Premium,* %	*Unsatisfactory,* %
Total plant population (approximately 3,000 employees)		50	20	
Arteriosclerotic heart disease (47 employees)	15	48	30	4
Rheumatic heart disease (24 employees)	4	46	30	4
Hypertensive heart disease (25 employees)	4	48	20	

In summary, the performance of cardiac workers in our study compares most favorably with the average healthy employee.

Dr. Belknap: I should like to comment on the hiring of cardiac workers.

For 26 years I have been medical director of a Middle Western manufacturing plant and during that time have performed pre-employment examinations on 25,000 to 30,000 workers. Their work has varied from strenuous handling of heavy wet-storage batteries, weighing 75 to 100 pounds, all day long to delicate assembly of radio switch controls.

In these 26 years I have rejected for employment not more than 12 to 15 individuals, and these have been primarily for emotional or psychiatric reasons. We have developed a policy of hiring and placing individuals in work suitable to their capacity regardless of the disease process they may have demonstrated. This means that I have recommended for hiring men who have had residuals of strokes, diabetes, rheumatic and coronary artery disease. Let me give you an illustration that is typical: Last month I examined a man for rehiring who had been absent for a chronic cough. However, this proved to be congestive heart failure. This was a man I had recommended for employment 15 years ago. He had had rheumatic fever, and even then he had an enlarged heart with mitral stenosis and insufficiency. We hired him for a relatively light mechanical job. He had had a good attendance and working record for 15 years, but he complained of a chronic "cold" and so-called "bronchitis." Since this was a nonoccupational disease, he did not come to my attention. He merely stayed away from work. Finally, after 6 months under a family physician's care he was sent to a private cardiologist. The cardiologist not only found rheumatic heart disease but detected, after electrocardiographic study, a recent coronary occlusion with resulting myocardial infarction. After 2 or 3 months his family physician said he could come back to regular work. I had to decide whether he should be allowed to return to work. I recommended that we hire him at exactly the same job that he had had at the onset of his symptoms, namely, as a small-machine setup mechanic. Then I established a gradual return to work schedule as

follows: 2 hours a day for 1 week; 4 hours a day for 2 weeks; 4 hours in the morning and 2 hours in the afternoon with a long 2-hour lunch hour for several weeks following. Now, after 2 months, he is on his regular 8-hour-day work period.

The family physician was pleased and somewhat surprised to learn about the gradual schedule for return to work. We realized however, that the physician, as in the case of most family practitioners, was not familiar with factory work. His initial statement that the patient could abruptly go back to work involved no understanding of whether it would be a full load or lighter work, or if he could return gradually to his previous job.

A physician in industry, whether full-time or part-time, can do a great deal for the convalescent cardiac patient, if he can consider him as an individual with pride in acquired skills which he should be allowed to utilize in his old job if possible.

Dr. White: Who are you—the practicing physician or the full-time physician in industry?

Dr. Belknap: Both. I am a consultant in internal medicine, a teacher in occupational medicine, a part-time medical director of an industrial plant, a consultant to a number of insurance companies, and I have also had a private practice in internal medicine for 30 years. Therefore, I believe I am justified in saying that a combination of all these points of view is possible and desirable. I am especially fortunate not to work for an industry with an out-of-state management insisting on screening restrictions against the hiring of coronary artery, hypertensive, rheumatic patients, etc. In my plant of 3,000, we have hired many employees who are not paragons of health; we have not, thus far, had any litigation following death. To be sure, we have had cardiac deaths. This plant is unusual then, in giving its physician a free hand to use his professional judgment and his own initiative as to the manner in which each case should be treated.

Dr. White: What about training people for industry? Will Dr. Franco comment about this?

Dr. Franco: This is most important. We do not see that in my company, but more in the work classification unit at the University Hospital, where we are projecting jobs for the young rheumatic cardiacs who are about to enter the labor market; these are mainly young men about eighteen to twenty years of age Although they may have no limitations at the present time one has to consider what they are going to be able to do in 10, 20, or 30 years. One must also be concerned about his future in the organization or firm that employs him. If he is physically limited, he may be denied promotion opportunities, particularly if he is in a heavy industry, or if he cannot perform all the functions of a job assignment. This creates problems both for the organization, because it may create a union problem, and for the individual because he is frustrated. These are some of the reasons it is necessary to take a long-range view in considering the employment of the young cardiac patient. This means, of course, that we advise against certain jobs that the cardiac worker may be able to perform adequately at the present time.

Dr. White: Is industry going to hire more of these young rheumatics as customs or laws change?

Dr. Franco: In the big industries, I doubt it. In small industries, I would say, yes. By big industries I mean those that require their employees to do heavy work and by small industries those that require less in terms of physical stress on the job. The big industries are disturbed about the collective disability-pay problem, and they are disturbed about the fact that most of the workers come into employment at the physical-labor level and then progress and train to higher levels. I am speaking particularly of utility, steel, and other heavy industries. But in the smaller industries where they are doing a special type of work, one will find, I think, an open field for workers with rheumatic heart disease. In certain highly specialized jobs, such as at Eastman-Kodak, where such workers are started at a very special type of work, they can do well, but in heavy industry I don't think there will be too many opportunities for rheumatic cardiac patients.

Dr. Stewart: Regarding actual placement of cardiac patients on the job, I think we need a good deal more research in the fields of work physiology and job analysis. Most jobs are classified in industry for pay purposes, and this usually has little to do with the energy requirements of the job. To me the sort of thing that Dr. Greer has done at Gillette, that Dr. Franco has done at Consolidated Edison, and that Drs. Hansen and Weaver have done at Esso Standard in Baton Rouge, is good. For example, at the Esso Standard plant the industrial engineer and the medical director classified jobs as to how much walking, stooping, climbing, lifting are required. They are getting an idea of the levels of energy required on various jobs in their plant. The cardiac workers are then placed in jobs that are within their physical capacity.

Dr. Hellerstein: In our work we tried to find good descriptions of various jobs. The descriptions given to us by management differed greatly in some cases from what we actually found on the job. We have been documenting each job pictorially in addition to studying energy requirements. We do this to visualize the position of the man at work, the equipment, the motions involved in the actual operation of the machinery, etc. For example, a man may be working at some type of punch press with a lever arm just above shoulder level. The pictures would clearly depict this problem, and these combined with energy-cost studies would illustrate the value of amended positioning of the lever.

Dr. Stewart: This is interesting because somebody has suggested a study of the 90 most densely populated jobs by means of motion pictures of men on the job. This to be followed by an analysis of the movies by industrial engineers to define the energy requirements of the job.

Dr. Bronstein: When you have a given patient and a specific job description, the job often seems excessive in terms of energy cost, yet one may find that the man is skilled in this job and knows short cuts which do not appear in the job description. Apparently these men can learn to avoid the peak loads which they know may cause them trouble.

Dr. Franco: This is most important. We do not see that in my company, but more in the work classification unit at the University Hospital, where we are projecting jobs for the young rheumatic cardiacs who are about to enter the labor market; these are mainly young men about eighteen to twenty years of age. Although they may have no limitations at the present time one has to consider what they are going to be able to do in 10, 20, or 30 years. One must also be concerned about his future in the organization or firm that employs him. If he is physically limited, he may be denied promotion opportunities, particularly if he is in a heavy industry, or if he cannot perform all the functions of a job assignment. This creates problems both for the organization, because it may create a union problem, and for the individual because he is frustrated. These are some of the reasons it is necessary to take a long-range view in considering the employment of the young cardiac patient. This means, of course, that we advise against certain jobs that the cardiac worker may be able to perform adequately at the present time.

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close our discussion of work and the patient with cardiovascular disease is the definition of total permanent disability.

Dr. Goldwater: We have to distinguish between impairment which is either physical or psychological and disability which is a combination of many factors. Physical impairment is only one of the features of disability. Disability also has components which are legal, social, vocational, economic, psychological, etc. I think we tend to confuse ourselves by speaking of disability as a medical concept. Disability is not only medical; it has many other connotations, as I pointed out I think that when we get that idea firmly in mind, we will be a bit closer to understanding what permanent total disability is A person can have a total permanent physical impairment who may not be disabled; yet a person in another community, with the same physical impairment, may be totally disabled. For example, a miner with a cardiovascular impairment which precludes hard physical labor is unable to return to his old job of digging coal. Theoretically he could repair watches, run a typewriter, or do many other jobs, but if he resides in a community where such opportunities are not available, or he cannot be retrained for this work, he is, for all practical purposes, totally disabled.

Dr. Rusk: I do not think there is one physician in five hundred who could really sit down and critically analyze disability.

Dr. Goldwater: It is not a medical problem, and the physician should not try. It is legal, social, and economic, even though the basis for determination of disability may be partly medical.

Dr. Levy: On occasion I have been asked to certify as to disability for an insurance company. I have taken the matter up with lawyers. Their legal definition is, in this state at least, that "total permanent disability," so-called, is that condition in which an individual is unable after an illness or injury to resume his former occupation.

Dr. Rusk: A friend of mine did a survey in Sweden for the

Dr. Gerber: This is all right for the fellow on the job, but when you have to fit a man into the job, you have to do otherwise.

Dr. Hellerstein: Job descriptions should consist of both what management provides and what the man provides, and the discrepancies have to be adjusted.

Dr. Morris: To include the rate.

Dr. Hellerstein: You have to individualize again, because the description management has is frequently dated from the war years. As a consequence many of them are inaccurate, because they have not been modified.

What a man does and what he is supposed to do may vary. For example, we had a chief mate who had heart disease with congestive failure and yet was working quite well. One of the industrial physicians did not believe he should return to work according to the description of what he should be doing at a time called "fit-out," when they are ready to go out after the layout of the work Presumably he was supposed to polish the brass, unload and cover the hatches, and things of that sort. When we asked him about this, he denied it emphatically and said it was below his dignity—he was an "executive." It was necessary to obtain the job description and analyze each item to show what was actually involved in his particular job on "fit-out" and "layout." It took the intervention of the union and consultation with another impartial authority, because the union contract provided for this The whole sum and substance was: What was the job?

This brings up an important point—that there is need for research in job design and better job description. I think the movie-description idea is excellent if it includes both current and obsolete equipment. Our vocational counselor, who is also counselor for the Jewish Vocational Service in Cleveland, has pointed out that there is not a good pictorial library of American jobs in existence at the present time.

Dr. Rusk: One other point I would like to bring up before we

3

The Practice of Cardiovascular Rehabilitation

Dr. White: We are all aware of the increasing interest in the field of cardiac or cardiovascular rehabilitation, not only by the medical profession but by various co-professional groups and by voluntary and governmental agencies Not only do we need a satisfactory definition of this term, but also direction is needed for the future for those interested in cardiac or cardiovascular rehabilitation. As part of a nationwide survey of cardiovascular rehabilitation sponsored by the National Heart Institute, we recently sent a questionnaire to a number of the nation's leading cardiologists and internists with broad experience in cardiology, asking them the following questions:

1. What would you consider a proper definition of rehabilitation, especially as applied to persons with cardiovascular disease?
2. What do you believe are the major problems faced by the practicing physician in his efforts to rehabilitate individuals with cardiovascular disease?
3. What do you think should be done to solve some of these problems?
4. In order of their importance, what measures have you found of value in the rehabilitation of your cardiac patients? A tentative list follows:

leather, coal, airplane, and steel industries. I shall never forget his hypothetical case. This individual had a total alopecia; he was blind in one eye, and color blind in the other; he had chronic arthritis, with 30 per cent limitation of range of motion in his shoulders and elbows, but could get his hands to his face; he had an old fibrous tuberculosis, which was healed; he had a mitral stenosis, which was compensated; he had a bilateral inguinal hernia; he had both legs off below the knee and developed dermatitis when he was in contact with certain dyes. The individual whom I have just described could do 50 per cent of all the jobs in the leather industry in Sweden. Bert Hanman who did this study matched the requirements of the job with the abilities of the individual.

Dr. Dock: Don't you think the real point of this is whether somebody *wants* to hire a man? The United States government will hire you for one job, but you may be totally disabled as far as the Army is concerned, and the Veterans Administration may be paying you total disability at the time.

Dr. Rusk: That is absolutely the truth. I will say that, while I am often discouraged, I am also heartened at what has happened in the last decade in American industry as far as employment of patients with physical disabilities is concerned.

tion, especially as applied to persons with cardiovascular disease?

Two excellent definitions reflecting the opinions of most of the group were given by Dr. Roy W. Scott of Cleveland and Dr. Clarence de la Chapelle of New York.

Dr. Scott defined a rehabilitated cardiac patient as "one who, within the physical limitation of his disease, has been psychologically oriented to accept the limitations and who has been returned to a productive and gainful status in his community with these limitations, without fear or anxiety, and with a sense of usefulness in his own eyes and those of his associates, both at work and in the community."

Dr. de la Chapelle defined rehabilitation as applied to patients with cardiovascular disease as "the art and science of restoring a person to that level of physical and mental activity which is compatible with the functional capacity of his heart."

The theme of the majority of definitions was the restoration of the patients to a useful and happy life within the limits of their physical capacities These definitions emphasized not only maximum physical restoration but elimination of fear and anxiety as well. As Dr. William Dock expressed it, restoration to an active life with the avoidance of neurotic reaction to organic disease.

2. What do you believe are the major problems faced by the practicing physician in his efforts to rehabilitate individuals with cardiovascular disease?

The physicians' answers to this question are best expressed in Table 5.

The problems considered to be most important directly involve the relationship of the patient and the physician. The necessity for the physician to eliminate fear about heart disease was considered to be the major problem. The elimination of fear and insecurity in the patient with heart disease, which is the first step in returning the patient to useful life can be accomplished largely by the efforts of the patient's own physician. The problem of the oversolicitous family in creating fear and imposing undue restriction also is one which can be most effectively dealt with

a. A full discussion with them regarding the nature of their disease, its degree, prognosis, treatment, and how they can best arrange their future life to fit the circumstances. If this discussion is indicated, when should it take place? Is a continuing follow-up program of patient education part of your practice?
b. Medical treatment.
c. Surgical treatment.
d. A trial of the patient in the resumption of his usual routine of life or of an improved course.
e. Consultation with persons trained in related fields such as social service, vocational counseling, physical or occupational therapy, spiritual guidance, etc.

5. Please comment on your practical experience in the rehabilitation (including perhaps comments on ability to return to work, social and psychological adjustment) of patients with the following cardiovascular diseases:

   a. Congenital heart disease
   b. Rheumatic heart disease
   c Hypertensive cardiovascular disease
   d. Coronary artery disease
   e. Cerebrovascular disease
   f. Neurocirculatory asthenia
   g. Iatrogenic heart disease
   h. Luetic heart disease
   i. Subacute bacterial endocarditis

6. Please give five or six examples of notable rehabilitation from your own practice, with or without names.

Thirty-six of the fifty physicians queried responded to our request for help in answering these questions. It should be emphasized that all the physicians queried were in active private practice and that they are daily faced with the problems of the individual with cardiovascular disease. The answers we received to these questions have been summarized by Dr. Bryan Williams as follows:

1. What would you consider a proper definition of rehabilita-

be the key to solving these problems of education. As would be expected from a group of practicing physicians, the emphasis was on the relation of the patient and his physician. In only three instances was the wider use of work classification units mentioned. However, in one-fourth of the replies, it was acknowledged that help would be obtained from modification of existing Workmen's Compensation and insurance laws.

4. In the order of their importance, what measures have you found to be of value in the rehabilitation of your cardiac patients?

Almost universally a careful, sympathetic, and particularly an unhurried discussion with the patient regarding the nature of his heart disease was considered the first and most valuable procedure in cardiac rehabilitation. It was emphasized that this should begin early in the course of the illness and should be continued during all subsequent interviews.

Most consultants felt that of equal importance was a trial of the patient at his usual occupation after recovery with as few modifications as necessary.

Consultations with persons trained in related fields such as social service, vocational counseling, etc., was thought to be occasionally helpful. Several doctors expressed disappointment with their experience with such consultation.

Dr. Irving Wright emphasized that the primary responsibility for the rehabilitation of the patient should be held by the physician and should not be "turned over" to those in related fields. The chief value of these services was thought to be in dealing with the indigent population, and many of the consultants thought that these services were of little help to the doctor in dealing with private patients. Occasionally help with very specific problems by ancillary agencies was thought to be of great value.

5. Please comment on your practical experience in the rehabilitation (including perhaps comments on the ability to return to work, social and psychological adjustment) of patients with the following cardiovascular diseases:

Table 5. Major Problems Faced by the Physician in Rehabilitating Cardiac Patients

	Degree of Importance		
	First	Second	Third
Elimination of fear on the part of the patient and his family	17	6	
Iatrogenic overrestriction (by the patient's family physician)	5	5	
Difficulty with compensation laws and attitude of industry toward hiring cardiac patients	3	5	8
Medical problems (actual treatment of patient)	4	1	2
Keeping patients restricted within the limits of their physical capacity	2		
Personal economic problems of the patient	1	3	2
Inaccuracy of previous diagnosis	2		

by the family physician or the consulting cardiologist. It is of interest that only two of the cardiologists found it necessary to urge their patients to undertake significantly less activity following discovery of heart disease.

3. What do you think should be done to solve some of these problems?

Table 6. Proposed Solutions of Problems Faced by the Physician in Rehabilitating Cardiac Patients

Patient and family education by the physician	12
Community education about heart disease, including education of management and labor	11
Better education of physicians	11
Modification of Workmen's Compensation and insurance laws	9
Increased social insurance to relieve the burden of illness	4
Wider use of work classification units	3
Increased facilities for vocational counseling	1

Dr. Charles C. Wolferth of Philadelphia furnished the consensus in stating, "The problems are those of education." Dr. Irving Wright of New York emphasized that the physician should

be the key to solving these problems of education. As would be expected from a group of practicing physicians, the emphasis was on the relation of the patient and his physician. In only three instances was the wider use of work classification units mentioned. However, in one-fourth of the replies, it was acknowledged that help would be obtained from modification of existing Workmen's Compensation and insurance laws.

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5. Please comment on your practical experience in the rehabilitation (including perhaps comments on the ability to return to work, social and psychological adjustment) of patients with the following cardiovascular diseases:

a. Congenital heart disease:

This was felt to offer a most fruitful group for cardiac rehabilitation, since so many lesions are correctable or at least improved by surgery. Even when only improved by surgery, patients were greatly helped psychologically, since they felt something had really been done for them. Opinion was expressed that the publicity attendant upon the more dramatic operations had been of great help in public education about heart disease.

b. Rheumatic heart disease:

Rehabilitation was thought to be largely dependent on the severity of active rheumatic fever, degree of valvular deformity, and the presence or absence of accompanying congestive heart failure.

c. Hypertensive cardiovascular disease:

It was felt that most patients in this group could carry on an active useful life, particularly with the aid of modern drug therapy in the more severe forms of the disease.

d. Coronary artery disease:

The experience with this group was largely covered in answers to other questions. Two major difficulties mentioned were the problems in returning patients to work when the compensation laws were unfavorable and the delay of returning patients to work when they were fully covered by sickness insurance. It was emphasized that the majority of patients do recover from myocardial infarction to a sufficient degree to return to their previous work with little or no modification in their activities.

e. Cerebrovascular disease:

In this group of patients, the greatest gains have been made in specialized rehabilitation centers and the techniques applied in these centers. There was much enthusiasm for the great advances which have been made in rehabilitating patients who have had strokes with resulting hemiplegia.

f. Neurocirculatory asthenia:

This was thought to be the most difficult group to handle, noting that these patients require constant effort on

the part of the physician and that they frequently have very deep-seated emotional problems Results of psychiatric therapy, it was noted, have been variable

g. Iatrogenic heart disease:

This is an important group of patients because of the frequency of the disease, and it was pointed out by one consultant that it may be completely and dramatically cured by the physician's efforts as some forms of congenital heart disease are cured by surgery.

h. Luetic heart disease:

This was considered to be a disease of relatively minor incidence and significance.

i. Subacute bacterial endocarditis:

Rehabilitation of this group was usually thought to be dependent on the degree of preexisting valvular damage as well as the damage caused by the infection. It was pointed out that the outlook for restoration to an active life is quite good in most patients with this disease, whereas formerly the mortality was almost 100 per cent.

6 Please give five or six examples of notable rehabilitation from your own practice, with or without names.

There were many very dramatic examples given, particularly of patients who had successful surgery of some type and of patients who had been misdiagnosed Particular note of the change in attitude as to prognosis in heart disease towards a more optimistic outlook was made by one physician.

I will not describe in any detail these case reports, because I am sure we could all cite many similar cases. I will ask, instead, for Dr. Howard Sprague to comment.

Dr. Sprague: We have heard definitions of rehabilitation, which, as Webster says, is "to restore to former capacity." That is the shortest one I have run across, but it implies to me that, before one can rehabilitate a person, he has to have a certain amount of ability.

Rehabilitation may start, as has been pointed out here by some of you in one or two instances, in the acute period of disability,

with the treatment of acute congestive failure or myocardial infarction, or a surgical attack on an acute embolic episode. Or it may start with a chronic condition, when it has reached or is about to reach a point of disability which could become another medical or surgical problem. This could include, for example, a surgical approach to congenital heart disease, to rheumatic heart disease, rarely to hypertension, and even more rarely, in my experience, to coronary artery disease, pericardial surgery, peripheral vascular disease with vascular grafts, or aneurysm. Or rehabilitation may start with the newer drugs for degenerative mental conditions, which seem to be amenable to medical therapy, at least to the point of improving older patients considerably.

In addition to these medical and surgical therapies, the direct *physical methods in cardiovascular disease apply*, I think, mainly to hemiplegia, postcoronary shoulder-arm syndrome, peripheral vascular disease, and to speech training, which has not as yet been mentioned.

The first step in rehabilitation, as has already been pointed out, and often the only step in prevention of severe crippling, is return to the status of self-help. What Dr. Rusk and his associates have done in this field has been tremendously encouraging and has greatly altered the attitude of many physicians. I am specifically speaking about the rehabilitation of hemiplegic patients. Restoration of ability for self-help is considered of primary practical importance.

The ultimate aim of rehabilitation is that of employment, and I include the housewife in this. I believe a job in itself is the most powerful therapeutic agent we have in rehabilitation. The point that was brought up earlier, namely, that it must be a job with status, is a very good one.

Our goal is, first, to return the patient to the same job, which I also agree is best. I have been amazed at how some individuals who have had heart attacks carry on with what is considered relatively strenuous physical activity. They can be returned much more successfully to the job they know, because they know how to spare themselves. They are much more efficient. They can lay bricks or handle stonework a lot better than they can be re-

trained in some other field. The old, familiar job should be first. The next is an easier job in the same plant through cooperation with employer and with plant physician. Thirdly, a new job, if necessary. Lastly, a new job which is attainable after retraining. Another way of stating it are steps from self-care to sheltered employment to self-employment and to competitive employment.

We start with the patient himself and certainly the will to recover, the will to live, and the will to be an active individual again. This is of primary importance. Then come the wife and family and those well-meaning friends and neighbors who give all sorts of advice. They are, let me say, anti-rehabilitative at times. The employer and the plant physician and fellow workers in the plant and the labor union—these are all important Of great importance is the family physician in the home or in the hospital, as well as the specialist. I will refer to some of these a little later. Others of importance in certain instances are the medical social service workers, the work classification units, and other private reemployment groups such as JOB (Just One Break, Inc.), the [illegible]

their affiliates.

Now a few words as to the role of these. I, and many others here, have emphasized the point of working with the individual. What I say here concerns our experiences only. I am talking about our particular pattern at the Massachusetts General Hospital or my own in private practice.

First, as to the patient, the family, and the employer. One of the best things for the patient is to know that his job is waiting for him while he is still sick He gets great reassurance out of that. Naturally, he thinks by definition that he is washed up. Of course, the family sometimes thinks this also. I have quoted the story of a patient of mine, a lawyer with a myocardial infarction, whose wife decided that he was no longer to be allowed to work, so she closed his office and sold his law library without his knowledge before he was out of bed. That was a roadblock as far as rehabilitating this patient was concerned.

The physician is important in reassurance and in evaluation of

the ability of the patient to return to work. Certainly the physician should reassure not only the patient when possible but also his employer about his chances of return to work and what he can do after his return. It is well for the physician to appreciate, however, that the placement of a cardiac worker involves not just what goes on on the job but how difficult it may be to get to and from the job, how many strains there are in the family life, and many other things. The cardiologist, the voice of authority, has a place in this because, whether rightly or wrongly, the patient wants an opinion spoken from high places. In a sense, if Paul White says that you are going to be all right, it is just not cricket to die.

Now as to the medical social worker. We come from the birthplace of medical social work. The Massachusetts General Hospital social service was started by Dr. Cabot, and for years we have integrated this into medical teaching. We have social service rounds once a week on our services, attended by all the students, house officers, social workers, psychiatrists, consultants, and nurses. During these the patient is taken up in detail as to various influences on his life. The student is indoctrinated early. He takes a social service and occupational history when he first meets the patient and carries along with it, sees how his patient is managed, and if necessary follows him in the outpatient clinic.

As for the other agencies, a comment about vocational rehabilitation: I am sure that these agencies, in common with all others, vary in relation to their efficiency because of their personnel. I know that we have participants in this conference who are in government service. Some of these agencies do not seem to have quite the ambition in placement of the handicapped as exists in some of the voluntary organizations. I would just state it quietly like that. At least that has been our experience.

The work classification unit, privately supported, is presumably staffed by dedicated individuals or it couldn't exist at all. One vitally important member of this team is the vocational counselor. To find good vocational counselors who are practical job finders, who know the details of industry, and who will take the patient and struggle to the last to get him placed, is very difficult. Such an individual is worth his weight in uranium.

The division, or bureau, of vocational rehabilitation is very helpful to us in being able to finance surgery on patients with mitral stenosis, but this is limited by the regulations in the "book." The patient has to be just sick enough. He has to be disabled enough. He cannot have mitral stenosis and not have enough symptoms, or they can't help you out; and he can't slip over into a stage of disability where they think you cannot do anything for him and so then they can't help you out. I think that this is a distinct limitation.

The Veterans Administration claims 95 per cent of its cardio- [illegible]

no figures beyond these.

In conclusion, I wish to point out some of the practical roadblocks in rehabilitation. Many influences in this country, which had been designed to give people what is called "security"—physical, mental, economic, emotional—have emphasized to the public the great insecurity of their lives, and this may very well constitute a major deterrent in rehabilitation. This is a matter primarily of education.

Another major roadblock is the resistance by industry to employ people over the age of forty. As far as any overt statement is concerned, this is perhaps not so universally practised now, but it has gone underground In advertisements for employment, there used to be such statements. "We are not interested in people over the age of forty-five." There was so much resentment against this that employers do not put that in the ads any more, but those who send people for employment know that it isn't of much value to send people over the age of forty or forty-five to get a job.

We have talked about pensions and it has been said that pensions are not part of the scheme of rehabilitation, because they tend to make rehabilitation impossible and permanent pension inevitable.

Workmen's Compensation has been mentioned. The legal profession presents a block. There are organizations within the bar dedicated to securing the largest financial settlement possible.

These legal situations, of course, discourage industry. Pending litigation also prevents rehabilitation.

Other factors include labor unions to a considerable degree in some industries, various kinds of disability insurance, and minimum-wage requirements. For example, one cannot hire the partly disabled individual at a lower wage with which he might be happy, society would be better off, but the minimum-wage law prevents this.

Finally, there are the blocks of lack of motivation and poor trainability. From a practical point of view, you and I know that skilled labor and the indispensability on the part of the given worker plus an avid labor market are the things that determine employment. Apparently, this is true even for the President of the United States.

Dr. Rusk: Thank you, Dr. Sprague. Dr. Holman, would you care to comment on Dr. Sprague's statements?

Dr. Holman: I can only agree and reemphasize the importance of treating the individual and not just the disease. Also, if the physician remembers that the sooner the cardiac goes back to work, the better, and the less the fact is advertised that the patient has cardiac disease, the better. This is, of course, one of the prob- [illegible] clinic, a cardiac [illegible] must be [illegible] inic, this may lead to his dismissal.

The patient who is properly rehabilitated ceases to think of himself as a cardiac invalid. This is one reason that in our own follow-up clinic in the work classification unit at University Hospital, we have the patient come in in the evening, so he will not have to take the time from work. I think this is important.

Dr. Rusk: Dr. Holman, would you care to comment further on the role of the physician in the rehabilitation of the cardiac, particularly with reference to the question of returning to work?

Dr. Holman: Despite the many advances in our knowledge of the

cardiovascular diseases, cardiac function, energy cost of activity, job analysis, and the like, we as physicians still must rely heavily on that quality often called "sound clinical judgment" when it comes to advising any given patient regarding his return to work and his participation in the ordinary activities of daily life. This is an extremely personal thing. In order properly to advise our patients, we must listen to what the patient has to say, and often we must observe the patient during activity. The physician must use good judgment in the interpretation of the history, physical signs, and the results of laboratory tests, all of which he utilizes in his evaluation.

The description of this approach to cardiology first came to my attention in the writings of Mackenzie and Sir Thomas Lewis. In his book, "Diseases of the Heart," Sir Thomas expressed himself on this subject as follows:

In gauging finally, a comparison between a healthy and an unhealthy individual is usually far less satisfactory than between the healthy and the unhealthy states of the same subject. In estimating the ease with which breathlessness is called forth, a careful interrogation of the patient is to be placed first, not only for the reason given, but for another that is equally important. For this interrogation, while acquainting us with the patient's bodily activities in his daily life, in work and in play, brings us at once into contact with the precise difficulties which the patient actually experiences, in brief, it provides just that information which will be required when the control of bodily work for purposes of treatment comes to be considered. The questioning should be close, therefore, and should cover a number of activities, so that, while full information is obtained, there may be an opportunity of observing consistency or inconsistency. But all patients are not intelligent, neither are they accurate in their statements, and grave inaccuracies are especially liable to appear when the examination is conducted for a public service or for purposes of insurance. It is desirable, therefore, to be familiar with normal reactions to simple forms of test exercise. It is undesirable that tests should become too stereotyped, or that they should be regarded as exact measures, a test that is convenient in one circumstance is inconvenient in another. It is important that the tests employed should be few in number so that reactions to them may be easier to know, and that the exercise performed should be simple and natural. No more than one or two tests are required in a

given case. It is a rule that no patient who exhibits breathlessness when standing still after undressing or while lying at rest should be tested. The tests in these are wholly unnecessary since it is already clear that there is no [cardiac] reserve.

In writing of work, Sir Thomas stated:

> A patient should not be told to leave his job, unless there is quite clear reason for his doing so, and unless it is thought he will comply. Occupation of mind and body banishes anxiety and cultivates contentment.

This approach can and should be used by the family physician and by the consulting cardiologist. It may also be broadened and involve a team consisting of cardiologist, psychiatrist, social worker, vocational counselor, and physiologist. This approach has been used to varying degrees by the cardiac work classification units across the country. The work classification unit staff might perhaps be defined as a product of our own generation of specialization. It is a gathering together of specialists who pool their combined skills to find an answer to each patient's problem.

Our concept of a successful work classification unit may be likened to a three-legged stool. The seat of the stool is the diagnosis. If it can be expected to bear the weight of a successful prescription, it must be supported by sturdy legs. One leg is knowledge of the social environment. This should include information about the family background, education, housing, and motivation. Another leg is knowledge of the vocational status of the patient. Assets in this regard include skill, training, experience, work habits, and adaptability. Liabilities include age above fifty-five, neurotic traits, lack of skill, and lack of motivation. Last but not least is the medical evaluation. The approach which we follow in our unit I have just outlined. This approach to the social, vocational, and psychological problems as well as to the medical problems can be followed by the family physician or consulting cardiologist, if he will take the time to do it and if he has the interest to develop the necessary skills.

I might add that the prescription for work, whatever level of activity it might include, is no better than the confidence inspired in the patient and in every individual who comes in contact with

the patient by the physician who advises the patient. Often failure of a patient to follow the advice of his physician is due to the fact that the patient or his family were not convinced that the advice given was the proper advice for the patient.

Dr. Bronstein: I quite agree that this is a job which the physician can do and do well if he will take the time. One important point is for the physician to ask the patient, "Exactly what do you do?" Dr. Hellerstein's case of the chief mate is a good example of this. The one I always give is that of a shoe salesman A man tells you he is a shoe salesman, and you think you have a good idea what this job involves He gets a box of shoes from the shelf, puts a shoe on the prospective customer's foot to see whether it fits, and then either sells a pair of shoes or returns to the shelf for another pair. In that particular job, however, he may be climbing up and down the stairs to get to the stock room, which is completely different from a situation where the stock room is on the same floor. There is a difference in that particular job if he has to run up and down the stairs or if the stock room is upstairs. If he has to do this to bring a woman a dozen different shoes and he is running up and down a dozen times, that makes a tremendous difference. This has no relationship to the energy expenditure. This has relationship to this particular job in this particular store where this particular person is working, and it is not emotional, either, because emotional tension of trying to sell a pair of shoes is the same under any given set of circumstances, but there is physical activity in this particular store which he may not have in another store.

Unless you ask him, "Exactly what do you do?" one cannot clearly understand the job requirements. I think this is part of an occupational history. One takes an occupational history, and you say, "What do you do?" The patient says he is a printer or lathe operator or something like that, and you feel that you have a pretty good history. You do not have any history at all. That is just a term which you are using to confuse yourself. However, if you say to him, "What do you do? How do you travel? How long does it take you to travel?" a clearer picture of his job evolves.

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have the confidence of the patient and his family, your advice will usually be heeded.

Dr. Rusk: Dr. Gerber, would you tell us a little of the role of the Office of Vocational Rehabilitation in this field?

Dr. Gerber: I do not rise in defense of the government vocational rehabilitation program, but I do believe a little explanation is in order. As far as the state vocational rehabilitation agencies are concerned, they do vary, as Dr. Sprague has said, very considerably from state to state regarding efficiency of operation. The responsibility for the efficiency of the program rests with the people of the state themselves.

I think I should briefly delineate the subject of the public rehabilitation program and how it operates. It dates back to 1920, at which time the Federal government realized that something had to be done about getting the disabled back to their jobs. It was originally established as a vocational training program. The medical aspects of the program entered into the program about 1943 and were expanded in 1954.

The purpose of the program is to help disabled people get back to work, or if they have not previously worked, to get them into such condition that they can work. The program is primarily for civilians, although any citizen, as a matter of fact, who is not satisfied with any other type of service can avail himself of the public rehabilitation program.

In the Federal government, the Office of Vocational Rehabilitation of the Department of Health, Education, and Welfare has the responsibility of dispensing funds to the states which are appropriated annually by the Federal government. These funds must be matched by the states in accordance with formulae which have been established, and the actual operation of the program, as far as the individual patients are concerned, rests with the state agencies. There are actually 88 state agencies, every state has an agency, and, in addition, 35 states and Hawaii have agencies that work only with the blind. If these 88 agencies were evaluated, one would probably find varying levels of competency and achievement.

Dr. McDonough: Many physicians evaluate the patient and then say, "Take it easy" or "Work up to the point where you are still comfortable." I think that neither of these is sound advice.

Dr. Bronstein: But that is only because the doctor is not sure, does not take a good history, and does not know about these things. I think if the average good physician in practice would take the time to talk to the patient and find out what the patient does on the job, he could usually tell the patient whether or not he could go back to that type of work. Of course, there are going to be cases where he cannot, but in medicine there are many things that you just do not know the answer to.

Dr. Lee: If these people with cardiovascular disease were not being managed reasonably well relative to their ability to work, there would be 10 to 14 million unemployed people, because this is the approximate number with cardiovascular disease in the country at the present time.

Dr. Bronstein: I think a lot of people who have private doctors go back to their own jobs if they can, whether the doctor tells them to or not Most of them do pretty well, but they do not get the advice from the doctor which they should. The doctor is not giving the patient the advice that he needs. The point has not been stressed about some of the reasons doctors advise or do not advise patients about work. I have talked to many doctors in general practice in small communities, and their reaction is often as follows. "This is all very well and good, but if I tell so and so to go back to work and he drops dead, I am going to have a difficult time in the community explaining his death."

That is why, in suggesting a work classification unit, the net responsibility can be shared, and the burden can be shifted from the doctor giving this advice to a more or less impartial group. This may be of benefit both to the patient and to the doctor.

Dr. Lee: You can also do the job even if you live in a small community. As Dr. Holman pointed out, if you as the physician

Another service, as was pointed out, is to pay for those services which the individual himself is unable to pay for. There are certain services of the program which are not provided gratis. The state agency will purchase these to the extent that the individual himself cannot purchase this service. All those services are purchased from the local resources when available. The services which are available once an individual has been declared eligible are all that he requires. This might be medical care of all kinds, prostheses, etc. I think it ought to be pointed out that, in order to be eligible for aid under the program, the law is specific as to who can benefit from the services. The individual first of all has to have a disability. The disability has to be a substantial vocational handicap, and, in addition, there has to be a reasonable expectation that the [illegible] provided by the

[illegible]

rehabilitation goal is going to be self-care only. I know a lot of criticism has been directed at our state programs because they do not accept such cases, but it is clear that they cannot under the existing laws.

If some of you take the point of view that this is the kind of program you want in your states, you should see that you get it. I have no sympathy for the people who criticize but do nothing. I think it is a reflection on them that they are not insisting upon the establishment of the kind of state program they should have.

At the Federal level, certain basic policies and standards are established, and as long as the state programs meet these minimum standards, little can be done about them. As far as that goes, the only thing we can possibly do ultimately, if any agency falls below these minimum standards, is to remove the Federal share of funds.

Certain stipulations in Public Law 565, passed in 1954, have allowed expansion of the program These are supervised directly from the Office of Vocational Rehabilitation Two of the chief ones are a program for training personnel who are in some way related to rehabilitation, and a so-called "research and demonstration fund" of money available to official as well as nonprofit

We recognize the concept that we are not rehabilitating a disability, but, rather, we are assisting people to get back to their jobs. The individual may present himself with a specific type of disability, but it is essential to do a total evaluation not only as to physical condition but psychological, vocational, and social condition as well. In other words, an attempt is made to meet all the needs of the individual. I wish to remind you that I am talking now purely from the theoretical point of view and about the ideal goals at which we are aiming. To do this, a general medical examination is required as well as such specialty examinations as might be indicated. A sound vocational rehabilitation program has to be based on a sound medical rehabilitation program. Obviously what the physicians give us and tell us is basic to the whole program. I am very sorry to say that, in a large percentage of instances, we get rather poor support from the medical profession. We can get relatively good pathological diagnoses—the diagnosis of the impairment as well as the basic pathology. As far as functional loss is concerned, the medical profession do fairly well but not well enough. The one item in which we are most interested, since we have the responsibility of getting these people back to work, in addition to evaluation of the disability, is the abilities of patients, and in this area poor support is received from the medical profession.

When our state agencies, in an attempt to get positions for these disabled individuals, approach the employer and the employer says, "What can this man do?" "Can you assure me he is going to be able to carry on?" the agency is left in the lurch, because it has no sound medical advice on which to base its reply.

As far as the functions of the state agencies are concerned, these are primarily correlative. The only direct services provided by the state agency are counseling, placement guidance, and some follow-up All other services, including medical, are purchased from available local resources. If they are there, that is fine. In the communities in which these are lacking, it is difficult for the state agencies to make provision for them. In many instances, the states have had to send their clients, as they call them, to other states in order to buy the type of service which is needed. This is a costly procedure.

should be made at this stage to provide those services that will reduce the individual's residual disability to a minimum.

Within this framework, then, what are we trying to do? First, we are trying to find all people with cardiovascular disease as early as possible and see that they have proper medical supervision. We have not done very well in this, because we do not know how to approach this problem except for children. School health examinations and maternal and child health clinics are finding children with cogenital heart disease and placing them into proper therapeutic channels.

Second, we think that there should be an accurate and adequate diagnosis. In this activity, we have been expending large sums of money for training people who want to learn a little more about cardiology but do not wish to become cardiology specialists.

Third, we think there ought to be an adequate prescription of treatment, and we think this prescription of treatment should include an assessment of the rehabilitation potential and a prescription of the services needed to try to fulfill this potential. In other words, a physician who is confronted with a patient with a cardiac disease, or a vascular disease, has to make an estimate of how fully this person is going to be restored to full activity at the time he begins a program of medical care This, admittedly, might be very difficult to project.

Lastly, we think we need to provide the facilities and services needed to carry out this rehabilitation process. Increasing numbers of rehabilitation facilities are being built at the present time. I do not know how many there are, and I do not know where we are going to get the money to run these centers, but funds are available to build them.

Regarding the services that may be needed in addition to the medical, we should include nursing service, nutrition, medical social service, physical therapy, speech therapy, vocational counseling, and so forth. I refer specifically to the type of service outside the hospital which provides a continuity of service from the hospital to the home. It is essential that the process be a continuous one. Right now many of these services are available, but they are so segmented and uncoordinated that the patient

organizations for research purposes. The amount of funds available in both these categories at the present time is small, but we hope it will be increased.

In connection with physician education, we believe that every physician practices or should [illegible] patient, even those needs which are not traditionally thought to be medical in nature. Obviously, when he is not going to be able to provide all these through his own skills or through the skills of the medical profession, he certainly has to be aware of what those needs are and which community agencies are available to help him take care of his patient, so that the ultimate objective for that individual can be achieved, which, in many instances, will be back to the job. In other instances, it might be back to self-care, but, in any case, he should be fully aware of all the needs and work to see that the patient is provided with requisite services.

Dr. Rusk: Dr. Gerber, how many people with cardiovascular disease have been rehabilitated through the Federal-state program?

Dr. Gerber: The last year for which we have real figures was 1954; the total was just under 3,000 persons returned to gainful employment. This was 4 per cent of the total number rehabilitated that particular year. There are about 10,000 patients with cardiac disease who are in the process of being "rehabilitated" through the public program.

Dr. Rusk: Dr. Stewart, would you tell us something of the role of the Public Health Service, particularly the National Heart Institute?

Dr. Stewart: At the National Heart Institute, we think rehabilitation should include not only those who have vocational potential but also those for whom increased proficiency and self-care is the only reasonable goal. We think rehabilitation should begin early during the period of definitive medical care. Every effort

tion on the work being done by agencies of large states in the field of rehabilitation.

Although the voluntary agencies do fine work, they cannot carry the load alone. When we check the number of people in need of care with those who actualy receive care, the difference is very great.

Rehabilitation of the physically handicapped calls upon every field of activity in health, education, and welfare. In New York State, *for example*, the *Department of Education has a 4-million*-dollar program for this activity, while the Department of Social Welfare spends 40 million dollars a year to provide pensions for approximately 40,000 totally and permanently disabled persons. There are also many disabled people receiving pensions because they have dependent children and the main source of family income is gone.

There are numerous opportunities for rehabilitation within our current program. For example, in the institutions of the Department of Mental Hygiene, there are many persons with cerebrovascular disease, with peripheral vascular disease, and with cardiac disease. We offer rehabilitation services to these people, whose care is very costly to the state. In New York the mental hygiene program costs 160 million dollars a year for the care of 120,000 patients. Many thousands of them have various forms of heart disease.

In states like New York, California, Michigan, and Illinois, there are programs of diagnosis, treatment, and rehabilitation which should be coordinated with the programs of the voluntary agencies, large universities, and medical centers.

It is unfortunate that in the program for the aid to the disabled nothing can be done for such patients until a physician certifies them as permanently and totally disabled. Preventive service should be offered before certification without having such service considered as interfering with the practice of medicine

There are also many opportunities for pediatric rehabilitation among the *group receiving pensions for dependent children*. Congenital heart disease could be detected early through screening techniques by careful medical examination soon after the family comes to the attention of the public agencies. The medical pro-

usually goes to one and then to another and finally ends up where he started. Such fragmented service does not lend itself to good care of patients.

Dr. Rusk: Dr. Chapple, would you say a few words about the Veterans Administration?

Dr. Chapple: I am not the best one to talk about the Veterans Administration, because I have only recently joined the organization, but I would like to make several comments: There are more than 112,000 beds in Veteran Administration hospitals. In a few years it is anticipated that there will be more patients at the present admission rate from the older age group alone than there are now beds. Of those now above sixty-five, more than 50 per cent fall into one of five diagnostic categories, the largest of which is the cardiovascular The patient material is there, and the *patients' services will obviously have to be provided.*

In several veterans' hospitals, rather extensive programs for the rehabilitation of patients with cardiovascular disease have been developed. These have been reported by Dr. Newman and his associates.

Dr. Sprague mentioned the recent release by the Information Service of the Veterans Administration (dated Jan. 12, 1956), which indicated that 95 out of every 100 veterans with heart or circulatory ailments rehabilitated through Public Law 16 are *working today as productive wage-earning citizens Of the veterans not working,* half said they were unemployed for reasons not related to their heart or circulatory disabilities.

Thus, the Veterans Administration is active in providing direct medical rehabilitation service to veterans. In rehabilitation, it also provides for vocational training and placement service for those individuals who require it.

Dr. Rusk: I would now like to ask Dr. Hilleboe to comment on the problem *at the level of the state government.*

Dr. Hilleboe: There appears to be a lack of information on the part of many specialists in cardiovascular disease and rehabilita-

tion on the work being done by agencies of large states in the field of rehabilitation.

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There are also many opportunities for pediatric rehabilitation among the group receiving pensions for dependent children. Congenital heart disease could be detected early through screening techniques by careful medical examination soon after the family comes to the attention of the public agencies. The medical pro-

fession can take the initiative by taking a broad look at this program to see whether or not the available resources and the facilities are being utilized in taking care of the case load they will have to manage sooner or later.

To provide high quality in our state operations in the field of rehabilitation of the cardiac patient, we need to combine research with training and service. Research and training inevitably raises the quality of service. It is not enough for a governmental agency to offer only service, because this too often deteriorates to a level of mediocrity.

In our planning we must not compartmentalize health problems as they occur but look upon them as overlapping problems in the broad field of public health. For example, we cannot separate the field of rehabilitation in its broad sense from that of chronic disease or from the increasingly important field of geriatrics. By combining our voluntary and governmental resources and using a state-wide approach, we can do a better job and could get more for our money.

Under certain state governments, there is an unequaled opportunity to do basic and applied research. New York has a state-supported chronic disease hospital in Buffalo which is now being devoted almost entirely to research in heart disease. It should be the function of the state to provide funds for such purposes and not leave this responsibility to the Federal government and private foundations. The state has so much at stake in chronic disease among persons on public assistance, especially in heart disease, and it has much to gain by investing in cardiovascular and rehabilitation research.

There is also a very practical problem in the field of rehabilitation of cardiac patients of all types. In state public assistance programs for aid to the disabled, people who are certified as permanently and totally disabled may receive a pension which may be for an indefinite period if the physician certifies these people as disabled. It is difficult to change that status. About half of the cases in New York State have cardiac disabilities. In terms of dollars this amounts to 20 million dollars a year for public assistance funds from Federal, state, and local sources. Once a physician certifies that a patient is disabled, it is quite

difficult to remove that person from the pension roll if he has been on it for at least a year. Either he does not want to be rehabilitated because of the pension, or he has become set in his pattern and he will not accept any type of rehabilitation, even though some help can be given Therefore, we need to urge our physicians to use every medical technique possible to keep such people from getting on the disability rolls. Expert rehabilitation services can do this in a surprisingly high proportion of cases. We could reduce the current load of these patients despite the increase in aging of the population by getting more physicians to do preventive work and rehabilitation.

Dr. Rusk: Thank you, Dr. Hilleboe. Will Dr. Marple comment on the activities of the American Heart Association?

Dr. Marple: The American Heart Association maintains a variety of activities concerned with the rehabilitation of the patient with cardiovascular disease.

Cardiovascular clinics have been established by many local heart associations with certification by the local heart association upon the recommendation of its clinic committee. Clinics may offer all medical services or only consultative diagnostic service. They may be concerned with all forms of cardiovascular disease or may be limited to a single type. The national office maintains a list of such clinics and offers guidance to affiliated heart associations and their chapters in establishing and developing clinics. The national organization has prepared and distributes a pamphlet which outlines the minimum and the recommended standards for cardiovascular clinics.

The cardiac-in-industry programs are concerned with the employment of persons with cardiovascular disease. Their objectives are to evaluate the work potential of the cardiac patient and the demands of particular occupations, to educate professional personnel and the public, to study state compensation laws, and to establish work classification units. The national office provides guidance by personal consultation and by the distribution of the series of pamphlets.

The work classification units are the hub of the cardiac-in-

industry program. Major accomplishments of such units include the selective placement of individual workers, the provision of vocational counseling services, and the establishment of sheltered workshops. There are now nearly forty such units which have been established by local heart associations. The national office maintains a list of such units and offers guidance in their development and expansion.

The heart-of-the-home program is concerned with the evaluation of the cardiac housewife and with the introduction of work simplification into the home. While directed to the housewife, it parallels the cardiac-in-industry program and may be, in fact, a part of such a local program.

The rehabilitation program is a continuing program carried on under the direction of a standing committee of the American Heart Association. Its objectives are (1) to develop an awareness of the rehabilitation concept among physicians, medical students, and members of co-professional groups and to encourage the teaching of rehabilitation in medical and other graduate and postgraduate curricula, (2) to stimulate public awareness, so that rehabilitation may assume its rightful place with the prevention and treatment of cardiovascular disease, (3) to develop studies, research, and demonstrations in the field of cardiovascular rehabilitation, (4) to develop community programs of rehabilitation. National efforts include sponsorship and participation in joint conferences on rehabilitation as well as the organization of regional workshops and the provision of consultation services.

Specific mention should be made of the intensive rheumatic fever program being conducted by the association and its affiliate chapters. Emphasis is currently on the prevention of rheumatic fever, for which a statement has been prepared and distributed widely to practicing physicians. Professional publications on the epidemiology of rheumatic fever, on diagnostic criteria, and on standards for convalescent care are supplemented by a large assortment of pamphlets and audio-visual material for education of professional workers, teachers, and children. Attention to the problems of congenital heart disease has also resulted in the publication of information on diagnostic criteria.

A major function of the staff of the national office is to provide guidance and services, especially through the affiliates and their chapters. Scientific and technical assistance is provided largely through the medical division; public information and education, through the division on community service and education. The latter unit includes a full-time rehabilitation expert. Statistical information and consultation is provided by two statisticians experienced in biological statistics and epidemiological methods.

Publications and other informational and educational materials, including a wide variety of audio-visual aids prepared and/or distributed by the association, are generally available through the affiliate heart associations and their chapters. Information concerning local heart programs and services can most readily be obtained directly from the local chapter.

Dr. Rusk: Dr. Ferree, as the physician in the American Heart Association most directly concerned with the rehabilitation program, would you care to add anything to what Dr. Marple has said?

Dr. Ferree: The philosophy that has been developed by the American Heart Association, as far as our rehabilitation interests are concerned, is that heart associations serve their function best in seeing that services, facilities, and knowledge are readily available to the physician to use for the benefit of the patient. In other words, our rehabilitation interests are patient-oriented and served through the physician's concern for his patient.

We believe that the association has an unexcelled opportunity to assume the leadership role, because it is comprised of professional people joined with laymen in a common endeavor. In that sense, the association has the opportunity to bridge the gap that often exists between professional groups and the lay and civic interests who have a great deal at stake in over-all rehabilitation programs.

As a matter of fact, in the present state of our knowledge, it is, I believe, quite generally accepted that community rehabilitation programs offer the greatest opportunity heart associations have of doing something constructive for the benefit of patients

through their physicians. Outside of the prevention program for rheumatic fever, which is rehabilitative, the chief emphasis that we are placing in our community-service activities is on rehabilitation.

This spring a series of five regional meetings have been held where we have sought to bring together all those who have responsibilities for, and resources to offer in, moving ahead jointly to do the job. Our reports are that the meetings did accomplish the purpose for which they were planned. Fifty-four physicians attended, and two hundred seventy-five out of a total of six hundred persons attending are active members of the heart association rehabilitation committees. We hope in the coming months that at the state levels these people will get together and develop some real joint efforts—teamwork—to attack the problem in their particular communities.

Dr. Marple mentioned the work classification units The existing 40 units in the United States serve approximately two thousand patients a year. This is in contrast to 10 units only 3 years ago. The interest that we have found on the part of the medical profession in rehabilitation in this field is very encouraging.

I think also we can all feel encouraged to know that not only the physicians but the co-professional groups are also very much interested, much more so sometimes than the medical profession. The skills of our co-professional colleagues must be appropriately used. The facts of the matter are that the job is such a vast one, costs become a matter of important consideration. Unless there is more extended and efficient use of medical social workers, vocational counselors, job analysts, and others as members of the rehabilitation team, the cost will be prohibitive.

While the work classification units have served relatively few in relation to the total load, their influence has been far more, proportionately, than the service to any individual, in the ferment and interest that they have created.

The heart-of-the-home program was mentioned. I think we can all feel indebted to the pioneer work done here in New York City on both work classification units and rehabilitative measures for the cardiac housewife.

In the matter of vocational counseling, the American Heart As-

sociation has joined with the New York Heart Association in support of a study of vocational counseling of children with heart disease or history of rheumatic fever. This study is being conducted by the Vocational Advisory Service in New York City.

We are concentrating our efforts on rehabilitation activities for the ensuing months. We have a very active committee that is devoting a considerable amount of time to setting out what would be a sound community rehabilitation program for persons with cardiovascular disease.

Dr. Rusk: Dr. Sprague mentioned the cardiac work classification unit in his discussion, and this was further elaborated by Dr. Marple, Dr. Holman, and by Dr. Ferree. Because there is considerable interest in these units from the standpoint of patient service, education, and research, I wonder if Dr. Lee would describe them in a little more detail.

Dr. Lee: The present-day cardiac work classification units are considered to be an extension of the original Bellevue Hospital Cardiac Clinic, which was originally called The Bellevue Hospital Social Service Cardiac Clinic for Working Adults. This was founded in 1911 under the direction of Dr. Herbert V. Guile, after Miss Mary Wadley of the hospital social service department convinced him of the need. The philosophy of this approach might be simply stated. "The majority of the cardiacs can work if selectively placed." The purpose of a work classification unit is, as Dr. Rusk indicated, threefold: (1) education, (2) research, and (3) service According to the American Heart Association, service is "to a limited number of individuals with a work problem recognizing the fact that not all patients with heart disease require the unit approach . . . to the community, providing a consultation service which supplements but does not duplicate other community facilities."

The ideal staff of a unit has been considered to be a physician trained in internal medicine and cardiology, a psychiatrist, a social worker, a vocational counselor, a physiologist or a physician interested *in*, and trained *in*, work physiology, a nurse, clerks, and technician. In some units the staff has consisted only

of physician and clerk, while in others most of the personnel previously named constituted the staff. In all it is considered to be a "team" operation.

The purposes of the individual units vary with their personnel and facilities. Some of them have been established primarily as research units, while others have been service units. The original work classification unit which Dr. Goldwater started at Bellevue Hospital in 1941 had as its purpose the study of two questions: (1) What types of occupations are best suited for patients with heart disease? and (2) what effects do various occupations have on heart disease?

From the standpoint of patient service, the results have been described in reports from units in New York, Cleveland, Philadelphia, Pittsburgh, and other major cities. The number of cardiac patients who have been helped is, as Dr. Ferree indicated, small in terms of total need, but, from the standpoint of the individual who has been aided, it has been a very valuable service.

Most of the units accept patients only on referral from the patient's personal physician, from industry, or from state or voluntary agencies. They serve primarily in a consultation capacity and do not provide any definitive care. The consultation may involve a single visit to the clinic, or two or more visits may be needed. Many of the clinics also have an organized system of follow-up to determine long-term results.

Dr. Hellerstein: My own feeling is that I would not be in this aspect of medicine if it did not have a research value in which basic techniques of investigation could be applied. I would not be interested in an exclusively social-service-oriented program.

Many people feel that these clinics should be established for service exclusively. They have a great service value, of course. I just came from Louisville, Kentucky, where a clinic is in the process of being established. In each community the problem is [illegible] have

[illegible] point where it has become a fashionable thing to talk about work classification, and every community wants to establish one. While

that may be admirable, we should more actively encourage units that are affiliated with medical teaching and university institutions to allow for more complete research documentation.

Dr. Morris: Concerning the matter of patient service, Dr. Hellerstein's unit in Cleveland is a very active one; yet they have evaluated only a little over one thousand people. How many people with cardiovascular disease do you estimate there are in Cleveland, Dr. Hellerstein?

Dr. Hellerstein: I would have to ask the Public Health people. Perhaps there are between one hundred thousand and two hundred thousand.

Dr. Lee: I think there are many good internists in this country who see and rehabilitate more cardiacs in a year than some of the work classification units. For example, at the unit in Los Angeles, California, only 55 patients were examined in the unit's first 10 months of operation. The total cost of the unit was almost nine thousand dollars. The cost per patient was well over one hundred and fifty dollars. This is another factor that must be considered. Are the units economically feasible? I might add that this example is not unique.

Dr. Bronstein: I am not at all certain that you are right, Phil, about the number of cardiacs rehabilitated by the average internist. I happen to serve as consultant to the New York State Department of Education, and I must say that the reports received from the average cardiologist, and I am not talking about the average general practitioner, in New York City are very poor. The vocational counselor or agency that is anxious to place these cardiacs in jobs cannot use the reports that the average cardiologist submits.

Dr. Lee: Because of the form of the report?

Dr. Gerber: You cannot use that as an argument. I did not express myself as strenuously as Lew has, and I am glad he

brings it out so strongly. There is no question that the average report we receive is very poor.

Dr. Lee: This brings us back to the problem of education. The cardiologists, internists, and other physicians making the reports are all educated in our medical schools. If we had the units as part of our medical schools or teaching hospitals, where both research and teaching would take place, I think they might serve a very useful function in indoctrination.

Dr. Morris: If these units are established to rehabilitate as a service, they couldn't be doing so frightfully well; but if they are set up to study the problems of rehabilitation and to educate people in rehabilitation, then I would point out they are not only doing this but they are educating industry as well, because these people have a greater force to exert on industry. As such, I think they serve a very useful purpose.

Dr. Bronstein: They are also educating the community.

Dr. Stewart: There was a vocational counselor on the West Coast who said that the establishment of the work classification unit was the best thing that has happened in a long time. The reason, he said, was that he did not think they were getting any better evaluation of patients than if they used any cardiologist, but for the first time instead of getting a piece of paper from the cardiologist which stated, "This person can do light work or moderate work" or whatever, the vocational counselor, the physician, and the social worker were sitting down and talking over what they meant by "light work," etc. This is a type of service which is very beneficial.

Dr. Morris: It still seems to me it would be beneficial to educate the physician so that in the future he would be able to describe in detail the type of work the patient can carry out.

Dr. Gerber: Doesn't this call for reevaluation of the whole work classification unit concept? I think now is a good time to take a

look at the situation to find out what the units have accomplished, what they can accomplish, and what they should be doing now and in the future. Perhaps we should be thinking in terms of *varying types of work classification units, those that would concentrate on research and those that would concentrate on service,* because not all of them can go into research or teaching. There is a need, I am convinced, for work classification units in the service area as well as those that can concentrate on research and teaching.

Dr. Rusk: We have discussed the role of the work classification unit in some detail, and I would like to say a few words about the possible role of the rehabilitation center in the matter of rehabilitating people with cardiovascular disease. Our own concept of rehabilitation in general is that 80 or 90 or *x* per cent of all rehabilitation is done by the physician responsible for the definitive care of the individual. This is done every day. We have *done it for years.*

However, I feel deeply that, for the very severely disabled such as we have been working with, the paraplegics, the quadriplegics, the hemiplegics, and the amputees, unless you have a comprehensive center where all the disciplines can be brought to bear on these individuals, they cannot be adequately managed.

We also have come to the conclusion over these past 10 years that *in such a setting for the severely disabled it is much better* to have all types of disabilities represented in the program. This is more desirable than to have an amputee program, a CP program, a multiple sclerosis program, etc., for obvious reasons: The paraplegic is glad that he is not quadriplegic if the man down the ward is. The man who has lost his arm is glad he can walk, and the man who has lost his leg is glad he has arms. The quadriplegic is happy he doesn't have multiple sclerosis, which is progressive. This can be a settling influence on all the patients. In [illegible]dition, in a few instances when we have brought in [illegible] with [illegible] problems, [illegible] the severely dis-[illegible] it has had a salutary effect. They, too, have obtained better perspective about their problems.

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should be active in research along with work classification units. Others can do statistical or comparative studies, but the laboratory work should be done by such groups.

Dr. Levy: May I ask a couple of questions? When you say having a unit for cardiac patients, do you mean all types of heart disease?

Dr. Rusk: Yes.

Dr. Levy: Then you would have to have, for instance, a surgeon who would be able to do cardiac surgery.

Dr. Rusk: No. No. This is part of the basic philosophy of rehabilitation. When training becomes primary, definitive care becomes secondary. Then, if you could have a team skilled to take on the training role, the patient remains the patient of his doctor for definitive care, for surgery, cardiac management, etc., and the rehabilitation team assumes responsibility for the program of retraining. Worked out with that physician in the center is a program where that individual can be observed by a team under work conditions prescribed after discussion between those in charge of the training program and those in charge of the definitive medical care program Then gradually the program can be stepped up until the patient reaches tolerance, the kind of job he can do is worked out in a setting with people who are skilled to do that sort of thing. Is there a need for such a service? If so, should it be a segregated service for cardiac patients, or should there be a place where this can be done in a general rehabilitation setting?

Dr. White: Wouldn't that apply more to cerebrovascular and peripheral vascular disease than to patients with varying degrees of coronary heart disease who really might not need this?

Dr. Rusk: To me it would seem that there probably would be a place in a rehabilitation setting for certain types of cases of pure heart disease. I do not believe that the average doctor or the

I know that we couldn't do any kind of job at all on our hemiplegics unless we had them together. We have seen those that have tried a home program, some of them for a number of years. They have been on isolated programs in a room in a hospital. I think private rooms almost make rehabilitation programs impossible. At any rate, they add 50 per cent to the difficulty. We do not have private rooms at the institute or on any of our rehabilitation services in the municipal hospitals in New York. Our patients are all in four-bed rooms or in large wards, regardless of race, creed, color, education, or pocketbook. Over the past 10 years we have never had any difficulty in following this policy.

I would like to bring up the point here, to get the feeling of the group, as to whether it is believed that in a general rehabilitation setting there is a place for a cardiac evaluation program, particularly for the very severely disabled cardiac. With highly skilled vocational counselors, psychiatrists, and psychologists, who are devoting their lives in aiding solution of the emotional problems of the physically disabled, would it be good to establish a section of this kind in a general rehabilitation setting, or would it be more valuable to have this kind of unit as part of a work classification unit?

What would be, in your opinion, the reaction of the cardiac patient upon entering such a program together with individuals with other problems? My own feeling is that in some ways it would be an excellent means for getting his mind off his heart. He would see other people with very difficult problems of a different nature. I think, before we get into detail about how to meet some of these emotional problems, that this basic point might well be discussed. I do not know and I doubt that anybody knows. I would be extremely interested to hear some discussion relative to this.

Dr. Sprague: It seems to me that separate institutions for rehabilitation of cardiacs should not be a necessary aim of our planning and that the major function of such units within rehabilitation institutions is perhaps mainly for research to answer some of the questions that have been raised today. In research, certainly the medical schools' departments of rehabilitation

habilitation. In my opinion, such an association seems to aid in rehabilitation.

Dr. White: Including coronary artery and rheumatic patients? I would think differently. I would agree with Dr. Bronstein. Coronary cases vary very much in their own course from year to year and may be managed individually better than in a group.

Dr. Holman: The cardiac is a special kind of disabled person, who on the surface has no disability, as was pointed out some time back by Dr. Benton. This works out, we have found, in a strange way in relation to his employment. Many employers, for instance, take a great deal of pride, or are beginning to take pride, largely due to Dr. Rusk's efforts, in employing the handicapped. Those same employers will often prefer to hire an individual with a gross physical handicap rather than a cardiac patient. This demonstrates to the others in the building what "grand guys" they are. Cardiac patients are not employed, because there is nothing to show with these!

Dr. Rusk: I think that a sheltered workshop and a therapeutic evaluation situation are very different. I would think certainly that it might be worthwhile to establish two types of experimental programs, one with a group of these patients in an active rehabilitation setup and with a competent psychiatric and psychological team, as well as a cardiologist who would oversee such a program, and another parallel program outside the framework of a general rehabilitation center, but as part of a work classification unit. I think these two types of approaches would be worthwhile from an investigative standpoint. I would be very much interested to hear Dr. Fisher's comment.

Dr. Fisher: I think it is very difficult to be absolute about how one can predict how a group of cardiac patients would react or not react. There is a certain experience with mentally ill patients in sheltered workshops; the workshops which have dealt mostly with patients with TB and heart disease in the past years have more recently been accepting patients who have been discharged

busy cardiologist can observe the patient for a full day with careful records of pulse, blood pressure, fatigue, pain, dyspnea, etc., and keep track of the patient's program, which would be gradually increased to the level commensurate with the patient's capacity. Could we, studying these patients in a rehabilitation center, come to a more logical conclusion as to what they can do, what their limitations are, than we now are able to in a general medical setting?

Dr. Bronstein: We found that some of the cardiac patients seen in our unit could not go back to work. They required a period in a sheltered workshop. It was noted that a fair proportion resented going to a sheltered workshop where there were people with other handicaps, particularly patients with paraplegia and hemiplegia.

Dr. Fisher made the point that cardiac patients usually do not reflect their heart disease as a disturbance of their body image. Perhaps these patients get so disturbed when they see someone else who apparently has a body-image change that it makes them aware of their heart disease, because many of these patients had to be removed out of these sheltered workshops where they were in the same room with individuals who were visibly physically handicapped. This surprised us very much, because we thought along lines similar to those outlined by Dr. Rusk. Why these patients with heart disease reacted in this way was a great surprise to us, and as a result, we were rather disturbed. As a result we are not using sheltered workshops where other severely handicapped people are included. We send them to a place where there are other patients with either tuberculosis or cardiovascular disease. Of course, that does not vitiate the possibility of having the patient in a division of a rehabilitation center. From our observations apparently separation of the two groups of patients is necessary.

Dr. Stroud: I am always impressed with Howard's ideas. I am surprised to hear what Dr. Bronstein said. It does seem to me that it is very encouraging for cardiac patients to see and be associated with others less fortunate during their program of re-

ference, it is that we must educate our own physicians and management and in addition put some pressure behind labor to recognize the problem in putting people back to work that have mild disorders, not the great disorders that are dramatic and heroic. We have millions that need proper reemployment, and I believe that is where we should place our emphasis.

Dr. Goldwater: What I have in mind is very much in line with what Dr. Irvin just said, but first I would like to go back to the use of the word *rehabilitation*. I think it is important to consider the setting in which certain programs are carried out, which we will call *rehabilitation* at this point. I think also something else that is very important has been overlooked, and that is that most of the rehabilitation job which we will consider to be the general management of a person who becomes sick and needs special guidance or advice as to what he can do about returning to work, and when he can, and what kind of a job he can do, etc., does not have to be done in centers but by the practicing physician.

This leads us to the problem of education. What does the practicing physician know, and what does he tell his patients? How ready is he to assume responsibilities? We know this is very important, too, and certainly one of the reasons why the restrictive approach has been used is that it is safer for the doctor. One of the functions for an organized program can be, if necessary, to share some of that responsibility with the doctor and to fortify him. If he said, "Yes, you can go back to work" and then something happens, he has the backing of some experts or other people that "take him off the hook" if something should go wrong.

Also, one thing which was mentioned in passing was the preventive aspect, the approach that will make it unnecessary to do a rehabilitation job. I think that this has only been hinted at and very little has been done about it.

One more important thing is that most of us who have worked in this field have recognized that if a person does sustain physical impairment and if he can get back to the job he was doing before, this is infinitely preferable to thinking of having him try something else. This should be our objective.

from a psychiatric hospital. Most of these have been psychotic patients. Controlled studies have been carried out. In the first report presented last year at the meeting of the American Orthopsychiatric Society, there was a special comment made about their anxieties and their concern about mixing patients. Psychiatrically ill patients and others who were physically ill were observed, and difficulties were anticipated. Actually there were no difficulties. The psychiatric patients integrated very well.

Patients with cardiac disease and tuberculosis accepted the psychiatrically ill patients. There was no condemnation of them or expression of anxiety or fear.

Dr. Bronstein: How about obvious physical defects, such as paraplegia?

Dr. Fisher: That is something else again, and I do not think we have any definite experience on which to base an answer. I do not know who does have this experience, except to point up that the patient who does have physical disability is thought of in a framework that has evolved over the years; namely, the patient is lame, halt, or blind, and there is fear of the patient on this account. This fear is being diminished as time goes on, with education. I think it is impossible to say just how a cardiac patient would react, and I would be inclined to favor Dr. Rusk's idea of establishing a pilot study to determine this.

Dr. Irvin: I hate to throw a bombshell into this, but I think we are missing the point. I spent last week end with medical directors who represented 4½ million employees in American industry. There were approximately twenty physicians representing 4½ million people. I think it is heroic and dramatic to concentrate on grossly disabled people, but our big problem in this country in employing these people is not with the grossly disabled people so much but to educate labor leaders, management, and our physicians to get the people with mild disorders back to work. Our big problem is not to handle 1,500 or 2,000. We have millions with mild disorders that we can't properly place. If there is one thing that should come out of this con-

reserve of their patients. A rehabilitation center for such purposes would be of great value. However, I feel that the greatest service that such a center could render would be to provide a team that would be in a position to help the cardiac patient who is an invalid because of emotional difficulties, either iatrogenic or simply as a result of cardiac illness. In my opinion, such a team would offer much more than any psychiatrist. I sincerely hope that Dr. Rusk and his colleagues will have the opportunity to provide a center for cardiac rehabilitation. This would fill a great need.

Dr. Levy: I am completely in sympathy with Dr. Rusk's idea of approaching this problem from the point of view of a study. I think that is the crux of it. This should be a pilot study or a research project to see what can be done. One can talk about this around the table indefinitely, but a ready answer would, I am afraid, not be forthcoming Eventually, if anything can be done, it will be as a result of an educational program, because this will help to educate doctors to the fact that certain things can or cannot be done for certain forms of heart disease. I think this should be approached from a research point of view primarily, and not from a service one.

Dr. White: Dr. Gordon Williams, who is assistant medical director of the Stanford Convalescent Home, has observed children with heart disease along with patients with arthritis, nephrosis, poliomyelitis, paraplegia, etc., all treated and undergoing rehabilitation together. Perhaps he would comment about this.

Dr. Williams: It is possible, of course, that our experiences would not apply to the adult group, which is the group which interests most of those here today. However, I think that, from the experiences in our small unit in Palo Alto, where we have a group of children with mixed disabilities and particularly with rheumatic heart disease, we can say that it is possible for these individuals to work well together, and I find it a totally satisfactory situation. I can illustrate with a story that will complement Dr. Rusk's feeling that individuals are glad they don't have another, more serious disability. A youngster who had had a very severe heart lesion and was in failure was in a mixed ward with paraplegics and severe postpolios. She commented several times that she was so glad she was not a cripple.

I think a rehabilitation center has a general advantage over a hospital ward for children with long-term handicaps in that the climate is a different one. It is one where the focus of attention of the physicians and the co-professional people is not at all upon the disability but rather upon the return to function that can be effected through the use of appropriate techniques and through educational procedures. A child in such a setting is less apt to become preoccupied with a disability produced by his handicap and is more interested perhaps in the means by which he is to return to a functional status. This for children, I think, is important.

Dr. Tarnower: I believe that the vast majority of cardiac patients can be evaluated for work by anyone who has a fair amount of experience in cardiovascular disease. There are, however, a certain number of instances that are difficult, if not impossible, accurately to determine. In addition, there are many practicing physicians who need help in estimating the cardiac

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The Teaching of Cardiovascular Rehabilitation

Dr. White: I should like to ask Dr. Brem, who is professor of medicine at the University of Southern California, to open the discussion on the problems of education.

Dr. Brem: I think perhaps the teaching of practicing physicians should have priority, since they are going to be the ones who educate the patients as well as the families of patients.

I do not mean to say that mass education of the public is not important, because this will serve to reinforce the things that the practicing physician will try to inculcate in his practice and the patients' families.

It appears to me that there are really two phases of rehabilitation in cardiovascular disease which should be discussed or even taught separately:

The first is in regard to the immediate medical problem, the acute paroxysm of tachycardia, the myocardial infarction, the episode of acute pulmonary edema, etc. Restoration from this sort of episode is part of ordinary therapy in cardiovascular disease, the intent of which is to restore the person to the maximal level of function. It requires a wise physician with the proper diagnostic acumen as well as the ability to evaluate the total problem

us who have done any work in this area I am sure have developed a sense and attitude which unfortunately is unknown to the majority of practitioners as well as to many teachers.

Dr. White: Dr. Benton works here at New York University. Would you comment?

Dr. Benton: The question of teaching rehabilitation to medical personnel can be considered at (1) the undergraduate level, (2) the graduate level or residency training, and (3) the postgraduate level for the practicing physician.

I shall not discuss the undergraduate aspects of the New York University program except to say that it has been evolved over the past 9 years and it extends throughout the 4-year curriculum and across departmental lines. The intent here has been not to make specialists of medical students in this field but rather to integrate the philosophy and techniques of rehabilitation into the content of all of the medical school years.

I should like to delineate the graduate and postgraduate programs that we have developed. We attempted to formulate a program which basically would aid in the development of good physicians and, in addition to this, add knowledge of specialized techniques which are essential for the individual who wishes to become proficient in the clinical management of patients with physical disabilities.

In the teaching of the resident physician we have emphasized as a basic premise the assumption of clinical responsibility for patient care This is in the best tradition of medical teaching, and I believe all of us would agree that in medicine one learns best by doing. His training, in addition, consists of didactic lectures, case presentations, seminars, and indoctrination reviews of specific clinical rehabilitation problems with participation in research projects in which the resident may develop an interest. Concomitantly, the resident also attends didactic sessions in the basic preclinical sciences. The New York University program is unique in that the Department of Physical Medicine and Rehabilitation has clinical responsibility for almost six hundred beds in a number of affiliated institutions. Many rehabilitation pro-

and to treat the patient properly. I do not think that falls into the area of the team effort that Dr. Rusk is speaking of, and I believe that he would agree. This area, however, is perhaps the most important from the over-all economic and social standpoint of the population as a whole. It is to the practicing physician that this phase of rehabilitation belongs. How the practicing physician manages these problems depends largely on what he is taught as an undergraduate and postgraduate student, and I believe this should be taught as general medicine rather than as a special subdivision. We teach this sort of thing to our students and residents in the normal course of medical education.

The second group I would characterize as those persons with chronic disability, whether due to organic changes within the cardiovascular system or whether due to a fixed emotional situation that renders them ineffective as far as productive work is concerned. These are the problems which belong to the team, because much more is involved, I think, than the usual practicing physician can provide. In our medical schools I certainly believe there should be a place for a program for the study and management of this type of patient, but perhaps it is even more important to emphasize the prevention of some of these disabilities.

The chief shortcoming in our medical school, and I am sure in others as well, is the underemphasis on the convalescent or restorative period of an illness in our patients. Our students receive a generous exposure to the acute immediate phase of disease, but very little to the posthospitalization period which is so important in the restorative process.

Perhaps the greatest contribution of a conference such as this is that it focuses attention on this important phase of medical care and education, which I am inclined to think is almost universally neglected.

Dr. Clark: To me, the essence of this problem is education in the basic concepts of rehabilitation. This should start early with students in medical school and extend progressively through the career of the medical student, intern, resident and practitioner, so that a philosophy will become ingrained which may spread to co-professional personnel, patients, and their families. Those of

ability such as hemiplegia, paraplegia, arthritides, children's diseases, cerebral palsy, poliomyelitis, dystrophies, and so on. These courses have been of great value for the immediate problem of presenting rehabilitation thinking to the medical community. The longer, more formal courses of training are necessary, however, to develop clinicians who will be assuming responsibility for the direction of the increasing numbers of rehabilitation facilities in this country and abroad.

While this developmental pattern seems suited to our situation at New York University, I am aware that local conditions in other institutions may predicate evolution of rehabilitation teaching along somewhat different lines

Dr. Feldman: In the undergraduate teaching program at New York University our objective is, as Dr. Benton indicated, not to train a specialist in rehabilitation but to allow the concept of total management to filter through to the student.

In the second year we teach this in the course on physical diagnosis or examination of the patient, which is really the introduction of internal medicine to the students. At that time we have the student examine patients with severe physical handicaps and emphasize the importance not of the disability but of the individual's functional capacity

In the third year we teach rehabilitation in direct conjunction with the departments of medicine and surgery. The teaching is carried out on the medical and surgical wards with the students currently serving as clerks in medicine or surgery. We attempt to bring the concepts of rehabilitation to the students as they treat an individual patient.

During the fourth year the students attend our weekly grand rounds. In these rounds specific disabilities, such as hemiplegia, tuberculosis, paraplegia, etc., are discussed, and the specific techniques of rehabilitating individuals with these disabilities and diseases are described. Teaching also takes place in the department of preventive medicine.

Dr. Dacso: The teaching of rehabilitation can only be as successful as the atmosphere in which it is being taught. That means

grams do not have bed service, although recent trends indicate that more are acquiring such facilities. Responsibility for bedside patient care is an extremely important aspect of residency training in rehabilitation, since this places the discipline on a firm medical basis. This is as it should be, since it is the physician who is responsible for the patient.

In addition to the physician, there is a group of co-professional personnel who act as members of the rehabilitation evaluation and therapeutic team, i.e., the physical therapist, the occupational therapist, the social service worker, the vocational counselor, the speech pathologist, and the clinical psychologist. In addition other medical and surgical specialists and consultants are required for comprehensive care. It is necessary that one person, however, be responsible for the patient, since patients cannot effectively be treated by committees.

One point that has been emphasized in our graduate training program is that we are not dealing solely with a physical deficit or disability but that we are concerned with a patient. Actually the resident is not only expected to consider and evaluate the patient's physical capacities but also to consider his vocational, psychological, and social status, since these are important factors in his eventual social reintegration.

This training program, designed especially for the development of the specialist in this field, is full-time, and extends anywhere from 1 to 3 years, depending on previous clinical experience and maturity of the individual. Our experience has shown that an individual trained in another specialty, such as internal medicine, can obtain a good grasp of the clinical fundamentals of rehabilitation in 1 year.

I should like, briefly, to make a few comments about postgraduate teaching. There has been a great deal of interest in recent years on the part of practicing as well as public health physicians in the field of rehabilitation, and our department has developed short, intensive courses for the purpose of training these individuals. In postgraduate teaching our approach is not to make specialists but rather to impart some of the philosophy of the field. This is done by giving a brief survey, using clinical demonstrations of patients in certain instances of physical dis-

people, and for the student to become involved personally with the problems of the patient but in a way which was beneficial to the patients and not destructive to the student We have made quite a few innovations, and they are, I think, on the whole, going to enable us to work towards the objective of helping the student in this ability to relate himself to the patient.

At the present time, for instance, in the last three semesters the student is in school, beginning in February of the junior year he has one half day a week throughout the 16-month period where with a preceptor he has access to an ambulatory clinic where he can see patients of his own and where he can follow these patients, acting pretty much as a family doctor for such patients I believe this prolonged continuity of relationship with a patient, plus his responsible role of dealing with a patient, are going to be good tools in giving the student the opportunity to develop his identity with the patient under controlled conditions. This program is only in its second year. We are going to do a better job this year than we did the first year. The first time, unfortunately, we got too heavily involved in orthopedic and neurological diseases. This happened to be an accident of scheduling. We became so heavily involved with severely disabled orthopedic patients that it was hard for the student to accept a significant role. The specialist was so involved to the extent that the student remained somewhat peripheral despite efforts to make it otherwise.

This year, for the second class in the program, we are aiming to pick patients with diabetes, heart disease, and other disorders in which it will be possible for the student actually to exercise the role of family physician We believe this is going to improve the opportunities for him to obtain from this the idea of concern about the over-all problem.

Just as an aside, I will say that the day before yesterday in Cleveland we had a meeting on medical education at which

lems relating to the program The senior students, who had had the first exposure, weren't -

we can only teach rehabilitation if the faculty is receptive to the idea.

In our medical-student teaching we attempt to make the students aware of the problems of disabled people, and we try to point out that as practicing physicians they will be faced with these problems every day. If they are aware of the many facets of the problem and if they are interested in helping their patients solve their problems, they will be able to do a great deal of rehabilitation without the knowledge required of a specialist in physical medicine and rehabilitation.

Dr. Caughey: I am primarily interested in medical-student education, and I am quite prepared to agree that the ideas involved in good rehabilitation practice are mature ideas, and perhaps they are best handled in a definitive way at the graduate and postgraduate level.

I think those of us who are involved in the medical school phase of education should be a little concerned, though, whether what we do to the students there actually impairs their ability to respond to the type of idea which will be presented in rehabilitation and which will be available to them in their later training period.

I would say that the thing we expect of a person who does good rehabilitation is that, first, he accepts the comprehensive responsibility and that, secondly, he is courageous enough to live with it and work with it day after day, in spite of the fact that it is difficult and frustrating and nobody is going to call him "God" for anything he accomplishes with these patients overnight.

This type of responsibility and courageous attitude are things which I believe depend on a very personal relationship with the patient, and we as educators in the medical school should look into the question of what we are doing to the student as a person, and to his ability to develop meaningful personal relationships with patients.

Western Reserve University has been involved in a very extensive revision of its undergraduate medical program. One of the basic things which we came to was the decision that we had to do something better to help the students see patients as

medical students, hours which were taken from the department of anatomy. This was not to give detailed therapy or definitive treatment, but to give them a provocative glimpse of the history of occupational medicine as related to their future practice of general medicine.

Another assignment was soon scheduled by the curriculum committee, so that the entire first-year class, in groups of 10, were to be at my plant for individual study of practical industrial problems. For the second-year students we like to stress physical diagnosis and the development of skills in assessing the normal in preemployment physical examinations. The cooperation and understanding of the rest of the medical faculty is important. For instance, our professor of physiology had had wide experience in aviation physiology, particularly as to the effect of compression and air-pressure changes in the use of the airplane. Since we make such general use of air transport, he recognizes this as a branch of environmental medicine.

Seminars and field tours are rewarding, since we observe how much the fourth-year student notes and finds significant, now that he has been oriented to the idea of occupational medicine through all the 4 years. However, the physician in general practice for 5 to 10 years still has the idea that a doctor connected with industry cannot be quite proper. They need to learn there is no more assembly work here than in private practice, where each patient must be studied individually, and that in occupational medicine there is the added emphasis on understanding the patient's method of earning a living. Physicians develop many new ideas during the plant tours when they appreciate the tensions during the work of intricate assembly and the monotony of repetition, as well as the skill needed to run a drill press.

Dr. Hellerstein: I have heard students in our rounds at Western Reserve who prepare a history and give a very adequate vocational description that any work classification unit would be pleased with. In fact, so much so that we have students in the third and fourth years, who take cardiology as an elective, work in the work classification clinic. I think this is interesting. They do a job I do not think is distinguishable from that of the more ex-

habilitation teaching. They felt that perhaps sometimes the team had organized conferences that were a little bit time-consuming, and perhaps did not mean as much as they should. They thought that if we could arrange the program in such a way that each of the students had about five patients with chronic disease, who were followed through the 16-month period, this would be an improvement. It would appear that the students are actually interested in carrying through with patients with chronic disease. This I believe is quite novel in medical teaching. Most of the things we do to students in our present traditional curriculum tend to rotate them around and rotate the patient around to such an exent that they don't have a chance to follow through and develop a really satisfying personal relationship. I believe this type of continuity program is something which can help to set the stage for undergraduate students who would profit by the kind of graduate and postgraduate education the other people have been talking about.

Dr. Belknap: In my teaching of occupational medicine for nearly thirty years at Marquette University School of Medicine, I have been impressed with the rather discouraging and bored attitude of the average fourth-year medical student. They seem amazed at the mere idea that they should develop an interest in what their patients have to do for a living. In spite of being residents of cities with many industries, they cannot seem to believe that they will ever have to deal with the patient who is out of the "white-collar" classification, or that hazards in industry can occur in rural areas or on farms. Our late Dean Carey, during a conference I had with him on the subject of starting the teaching of industrial medicine in the fourth year of medical school, stated: "It is too late to begin this new idea at that time You must start much earlier, before the medical student's mind is closed as it is likely to be by the time of graduation."

At a recent meeting of our curriculum committee, when the problem was discussed, the other members offered to give me some hours, so that I might have more than my 17 hours in the fourth year and 3 hours in the third year. I soon received notice of assignment of 3 additional hours to be given to the first-year

misdiagnosed cases that are referred for help because of alleged heart disease resulting in work problems to the original Bellevue work classification unit. In our experience at Bellevue, the patients who were referred with a diagnosis of, but who did not have, heart disease ran about 25 per cent. I think this supports the idea in a sense that our major job is to teach the medical students how to make proper diagnoses. This is not the only job, of course. I also believe that a proper understanding of environmental factors is often of great importance, not only in the management of the patients but also in making the diagnoses.

Dr. Hilleboe: Postgraduate education for physicians in rural practice is quite different from what it is in urban areas The problem in the rural areas is to reach the physicians who are in general practice, about half of whom frequently do not come to medical meetings. It can be accomplished, however, by determining the location of the physicians, the number who are registered to practice, and then by establishing postgraduate courses in the communities where these physicians are practicing. Attendance at these meetings should be verified to determine those physicians who have not attended. When this is determined, a campaign should be instituted to encourage these physicians to attend the courses. Attempts have been made in upstate New York to do this in various areas. The state health department helps, first of all, by making available certain subsidies to the medical schools to develop postgraduate centers In Buffalo, for example, we make a contribution of twenty-five thousand dollars a year, which enables the medical school there to hire a full-time director as well as assistants for the program. The second thing the department has done is to cooperate with the state medical society in providing speakers for county and city meetings upstate. For example, the state health department has found that the physicians are very much interested in heart disease. It has been noticed that there is a wide disparity in the information given general practitioners about heart disease. This includes information concerning the rehabilitation of a person with coronary artery disease. It would be exceedingly helpful in preparing

perienced clinicians. First of all they learn the need for a detailed approach, and they obtain a good vocational history. They break down the vocational history from the standpoint of stresses and details of the job. In addition, there are courses in applied physiology. This is the physiology of life, emotional stresses and work situations. There is enough information today to make this an attractive course. Finally, as Dr. Caughey pointed out, the students are now exposed in a good portion of their medical career to the many problems that are faced by patients with chronic disease. I think this will result in the training of physicians who will be equipped to deal with the rehabilitation as well as with the medical problems of their patients.

With reference to education in general, I would say there are two approaches: One is to teach the present medical students so that we know that every year we will have five or six thousand new doctors who are aware of these problems. In a matter of 10 years we will have a high percentage of the medical profession oriented to rehabilitation. This is one approach. The other is for the American Academy of General Practice and for the American Medical Association to offer practical instruction in rehabilitation for the practicing physician. I think the approach to the medical students will be more fruitful.

Dr. Goldwater: I think I might start by repeating a remark made earlier: The extent to which one can teach rehabilitation philosophy and its acceptability depends to a great extent on the climate in which you happen to be working. I am sure there is a great variation from school to school in this particular environmental factor. The school with which I am connected is one in which the scientific approach to medicine is very highly emphasized. The feeling is, I believe, and I am in substantial agreement with this, that there is so much that one has to try to teach to medical students that one cannot hope to do everything, and perhaps the most important thing to do is to teach the students how to make accurate diagnoses. This, of course, relates to the preventive aspect of rehabilitation, because it is the misdiagnosis which very often results in the necessity for rehabilitation, as witness the cardiac problem and specifically the large number of

misdiagnosed cases that are referred for help because of alleged heart disease resulting in work problems to the original Bellevue work classification unit. In our experience at Bellevue, the patients who were referred with a diagnosis of, but who did not have, heart disease ran about 25 per cent. I think this supports the idea in a sense that our major job is to teach the medical students how to make proper diagnoses. This is not the only job, of course. I also believe that a proper understanding of environmental factors is often of great importance, not only in the management of the patients but also in making the diagnoses.

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garding courses for general practitioners to have some guide lines

diagnosis, treatment, and rehabilitation of coronary artery disease.

Dr. Dacso: Dr. Hilleboe's concern about the problems of educating physicians in rural areas is shared by many of us. I believe it is a reflection of the problem caused by the scarcity of trained professional personnel generally. The medical and other professional schools have to be assisted and encouraged in their effort to teach the concept of total rehabilitation both as a specialty and as a fundamental approach throughout their curriculum. More conferences by medical educators will be needed to clarify the concept of rehabilitation and establish some degree of uniformity in its teaching. Only such efforts can be expected to re*lieve the incapacitating scarcity of trained personnel. Intensifica*tion of lay education will have to place rehabilitation in its proper perspective as to goals and potentialities as a medical specialty. The distribution of such information will discourage miracle seekers and save many people from frustrating experiences that tend to make them disappointed and to give up hope forever.

Dr. Stewart: We talk about patient services, and we talk about the services rendered by physical therapists, occupational therapists, nurses, medical social workers, and all the other co-professional personnel. Although large sums have been spent to train people in various medical research disciplines, little has been spent to increase the number of trained co-professional personnel. For example, we are now graduating medical social workers at a rate equal to the rate at which trained workers are leaving the field. The same is true for dieticians and, to a lesser degree, for nurses. We can talk about these services until we are blue in the face, but if we do not have the people to staff the programs, the work will never get done.

Dr. Hilleboe: In our health department, aside from the program of postgraduate training for general practitioners, we have

short courses of various types for public health nurses, occupational therapists, physical therapists, and others in every field of public health including heart disease and rehabilitation.

Dr. Caughey: As a possible remedy for some of this, I would like to suggest that the National Heart Institute give vigorous support to educational programs in several categories, such as the following: (1) postgraduate institutes, seminars, hospital staff meetings, and special clinics devoted to rehabilitation of cardiac patients; (2) fellowships of 2 to 12 months' duration designed to encourage residents in internal medicine, pediatrics, or general practice to seek special training in cardiac rehabilitation; (3) medical-student fellowships of 2 to 3 months' duration designed to encourage medical students to work during vacation periods in work classification clinics and on the analysis of these clinics' records.

Dr. White: Dr. Marple, what part does the American Heart Association play in this?

Dr. Marple: Under the direction of three standing committees —Program, Publications, and Professional Education—the association offers the opportunity for the transmission of information on rehabilitation to the physician through a variety of media. The Annual Scientific Sessions provide a forum for the verbal presentation of facts to a large medical audience, and this year are to include a symposium on rehabilitation. The journals of the association, *Circulation* and *Circulation Research,* reach a considerably larger professional audience Perhaps most appropriate for bringing information on rehabilitation to the practicing physician is the monthly publication *Modern Concepts of Cardiovascular Disease,* which is distributed to more than seventy-five thousand physicians. Additional media recently introduced into the program of the association are various audio-visual devices, including the recorded lecture, an extremely popular technique for learning among practicing physicians. Mention should be made of the various clinical standards developed and published by

committees of the association which become widely accepted as standards for American medical practice. Professional publications and other educational materials directed to the physician and other scientists, including films and audio-visual devices, are demonstrated at many national medical scientific meetings and at regional and local meetings of heart associations through the medium of special exhibits entitled "Your Heart Association Serves the Physician." The association now produces and distributes a large number of pamphlets and visual aids, including several concerned with rehabilitation and work simplification, for the information and education of the public. There are, furthermore, two periodical publications, the *American Heart Quarterly* and the *Heart Research Newsletter*, which are regularly and widely distributed.

Dr. White: What are your own views on this matter of education, Dr. Marple?

Dr. Marple: As in all education, I believe that motivation of the student is highly important. I believe the principles of rehabilitation should be taught early in the medical curriculum, and I think it should be integrated with the total teaching program and especially with the clinical program. Rehabilitation is part of the total medical care of the patient, and it should always be taught as such.

In my personal experience, the community survey is of tremendous value in learning about the social and economic aspects of illness, as well as in assessing community resources. The experience gained through such a survey will awaken the student to the realities of medical practice and stimulate his interest in the concept of total care of the patient. A most valuable aid to both physician and patient would be a two-volume practical guide to the rehabilitation of the cardiac. One volume, intended for the physician, would outline the principles and philosophy of rehabilitation; enumerate and indicate the practical use of procedures, techniques, devices, and the technical aids to the management of the cardiac patient, particularly in regard to rehabilitation; and provide a selected bibliography of additional sources

of information and advice. The essential point of the volume would be its practical usefulness. The second volume would be a guide for the patient and would be intended to educate him in regard to his disease. "You and Your Heart" is a book directed towards this end.

Dr. Fisher: Someone said something about the psychiatric aspect of cardiac disability. As a matter of fact, as for disability in cardiacs, it is pretty well agreed that so much of it is of a psychological nature that it would seem to me pertinent to say a few words about teaching of psychiatry in the medical school on the undergraduate level, as well as on other levels. In particular, I should like to cite what our experience has been and what would be necessary in view of the needs that have been expressed here today. On a traditional level, psychiatry has been taught so that clinical contact has been primarily with psychiatric patients, schizophrenics, and manic depressives, and so on. As a matter of fact, in the course of his experience, the medical student is not going to see very much of this except to be able to recognize it and to call in the appropriate specialist for management. The sort of psychiatric problems the average practitioner will be seeing will not be of that nature but of the nature we have been talking about for the most part here today. The question is how to get across to the students, early in their careers, an awareness or some kind of understanding of the nature of personality, the nature of anxiety, and the problems of psychosomatics and, in a broader sense, somatopsychics. It would seem to me that in a teaching program psychiatry should be taken out of the psychiatric hospital as the primary teaching locus. There has to be that kind of teaching, of course, but the psychiatrist should go to the medical, surgical, rehabilitation, and obstetrical wards, and so on, to work with the patients and the students, and carry on the teaching of psychiatry or psychological forces under such conditions. At New York University, the department of psychiatry has a teaching program which runs through the entire 4 years. In the third year we have 6 weeks of teaching in which 4 weeks are spent at Bellevue Psychiatric Hospital, with 2 weeks on the medical wards of the general hospital. I think this in itself

is helpful in terms of getting across the comprehensive approach. This is important in the field of rehabilitation.

We have a teaching program on the rehabilitation service for the resident, the nurse, and other co-professional personnel which is carried on at many levels, one of which is a psychiatric conference held regularly. Over a period of time there has been a transmission of an understanding of a concept of psychiatry, but perhaps even more important than that concept, the concept of a personality who has an illness and disability. It has been interesting to observe, for example, in the wards at Bellevue, how the attitudes of the co-professional personnel have changed. Whereas in the beginning there would be reactions on their part of disapproval or hostility to a patient who was demanding or not cooperative during the program, it is fairly rare to see this at present after 2½ years of this program. What they are interested in is to understand a person rather than to react at a superficial level to the person.

One of the gratifying things I could see in the comprehensive program outlined by Dr. Caughey was the helping of the student to become a mature person as well as a good physician, and assisting him to assume responsibility and to be courageous in that sense.

Dr. White: Dr. Rusk, would you give us your views on this matter?

Dr. Rusk: I think I can best summarize my own attitude by telling you what I tell the freshman class every year in the second week after they come to medical school, when I am privileged to lecture to them. I say, that as far as our department is concerned, I would be satisfied and feel that their time had been well spent if they learned only one thing in their 4 years. If they obtained the same inner satisfaction out of taking an old hemiplegic patient out of a wet bed, teaching him to walk, to talk, to dress himself, and to live the best life he can hope for out of the hospital that they now get out of making a diagnosis of histoplasmosis or aleukemic leukemia, which they may see once in a decade of general practice, then I think their time will have been

well spent, because 90 per cent of their time in practice will be spent with the problems of chronic disease and psychosomatic problems. If they feel insecure when they see the hemiplegic patient, then they will become a potassium iodide–phenobarbital manager of the hemiplegic, and they will continue to feel frustrated and irritable when they see these patients, because they will get no joy out of it.

As in any other medical specialty, our whole concept about teaching undergraduates is to teach the student that the physician has a total responsibility to the individual, that his job is not finished when he writes the discharge note on the chart. If he has a problem, a social problem at home or a problem at work or the problem of relating back into the community, the physician should also concern himself with these aspects.

I use this illustration sometimes: I say, "What would you think of me as an internist if I called the chief of the laboratory and said, 'We have a difficult problem here. I want you to do every test you know in the book You are going to be responsible for the tests. When you do the tests, come back to me and report on what you have found, what it means, and then tell me what you think is the matter with this patient and what you are going to do about it.'" We do the same thing with the social tools every day. We say to the social worker, "You take care of the social and family problems Help get this fellow a job or place to live, that is your responsibility, I wash my hands of that." We can't do that. It is a more potent tool in the hands of the physician, as far as the patient is concerned. I can't agree with Dr. Goldwater that the primary function of a medical school is to teach diagnosis and the scientific phases of medicine only. I think if you do this and emphasize it to a great degree during the 4 formative years, it is bad for the student. I think it is one reason the freshmen lose the stars in their eyes by the time they are seniors. I think the concept of rehabilitation has to be incorporated as a basic philosophy of teaching. It has to be taught by both precept and example. If only we could find out what was the priceless ingredient possessed by people like Howard Sprague, Bill Dock, Bob Levy, Bill Stroud, Paul White, Herman Tarnower, and the other clinicians who do this by that perfect sense of pitch—if only

we knew how to measure, define, and teach it, then 90 per cent of our problem would be over. I do not know whether it can be taught or not. I think it rubs off. As Bob says, you get it by absorption, but the absorption level is certainly highly variable in different individuals, and I think some never learn.

5

Research In Cardiovascular Rehabilitation

Dr. Rusk: In this discussion we have touched on the problems of research, particularly with regard to work physiology, the work classification unit, and the rehabilitation center I would like to ask, before we close, for ideas about research in cardiovascular rehabilitation

Dr. Benton: Two of the outstanding basic research projects in the field of cardiovascular rehabilitation have been discussed here today, namely, the study by Dr. Hellerstein in Cleveland and the Purdue Farm Cardiac Project with which Dr. Morris is associated. [illegible]

critically needed I am sure the next few years will give us better and more complete documentation in this area, as a result of closer integration of the work of the physiologist, clinician, and industrial, medical, and engineering personnel.

[illegible]

effects of placing cardiac patients back at work should also be considered with more careful analysis of the psychological, insurance, compensation, industrial, and other community considerations.

It is indeed heartening to note the marked upsurge of interest in all of these research parameters since we published our own modest study, almost five years ago, on the physiological responses of cardiac patients to standardized activities of daily living, including the use of the bedpan! I am hopeful that simpler and better methods will evolve for testing as the result of all of these studies.

Another important needed research area is a broad approach to problems of cerebrovascular disease. Here, too, basic as well as applied studies are required for one of the more important clinical entities presently being managed in rehabilitation settings, i e., the patient with hemiplegia as a result of a cerebrovascular accident.

Dr. Gerber: I would like to see more research on the actual tolerance, or capacity, of the cardiacs for work. This would not be merely a study in a physiological laboratory but along the lines described earlier by Dr. Hellerstein.

Dr. McDevitt: I was very much impressed with the work of the physiologists studying the effect of various activities on the cardiac patient under actual working conditions. If possible, such studies should be extended and the information more widely distributed.

Dr. Greer: Our discussion was to help decide where research in the field of cardiovascular rehabilitation could profitably be done. Earlier I presented some results of a small pilot study in one type of industry with a liberal and enlightened management. It would be hoped that one could interest other companies in similar studies. Until more facts are known about cardiac workers, we cannot expect industry to make this contribution to society. The most we could expect is for a few enlightened companies to permit such a study but not to support it. If funds not

contributed by industry were available for a quiet reinsurance of risks, some companies might be interested. Certainly industry could expect benefits from such a study. There is no question that medicine will have to assist industry in defining the scope of employability of persons suffering from heart disease. In 1951 thirty-one per cent of the death claims granted in Massachusetts were for heart disease, representing settlements of over five hundred thousand dollars. What constitutes valid industrial aggravation of cardiac disease? Industry must be dissuaded from feeling automatically penalized by retaining in their employ persons who are suffering with degenerative disease. It is not likely that the present basis of compensation awards will be narrowed. Neither is it likely that a board to pass on the medical merits of all heart cases coming before Workman's Compensation board consideration would be legal. One possible answer seems to be the establishment of the "second-injury" principle in cardiac compensation cases. Studies should be made as to the relative hazards, the accident proneness, the work performance, and the average absenteeism of the worker with specific cardiac disability. These factors will vary with certain industries. Perhaps, for example, it would even be shown that hypertensives are assets, since they are usually hard-driving, conscientious producers. Industrial populations present ideal situations for cardiovascular research. Cardiovascular rehabilitation has been defined as the art and science of restoring the patient to the level of physical and mental activities that is compatible with his cardiac functional capacity. It was emphasized here that this can only be accomplished after basic research provides the best approach. Benefits will be noted only after appropriate education of the physician based on the data derived from such research.

Dr. Belknap: I would agree with Dr. Greer. Research should be done to help answer the question "Can industry afford to hire cardiacs?"

Dr. Franco: From the point of view of a physician in industry, I would also agree. I think research could be productively pursued in the field of functional capacity of the cardiac in relation

to actual job demands. To be valuable for the industrial physician, however, this would have to be based on practical clinical tests such as could be performed by the physician himself using relatively simple equipment.

Dr. Goldwater: As to areas in which I think research could be productively pursued, I must say that I have nothing new to offer. There is still room for a great deal of work to be done on the basic problem of the effects of employment on the course of heart disease. There is a great need for more study such as that reported by Dr. Greer. There are, of course, many other research needs of which you are all very well aware.

Dr. Brem: I think we very much need reliable and objective methods of determining true cardiovascular disability. This problem is, of course, being attacked by many groups, and whether the criteria can ever be solidly defined may be in some doubt. However, it seems worth pursuing.

Dr. Fisher: I think that studies "on the job" are of great value, and I also think that Dr. Rusk's suggestion regarding cardiac patients in a rehabilitation center is an excellent one. In the field of the emotions and patients with cardiovascular disease, it is apparent from our earlier discussion that much needs to be done. Areas for research which might be considered include (1) psychological factors in the etiology of cardiovascular disease, (2) psychological stress factors related to the precipitation of cardiovascular accidents such as myocardial infarction or cerebral infarction, (3) psychological factors which contribute to the emotional reactions of patients to their disease, in acute, convalescent, and rehabilitation phases, (4) physiological and biochemical responses during psychological stress, and (5) studies on proper methodology for defining or quantitating psychological stress.

Dr. Stewart: Dr. Fisher is quite right. Earlier discussion certainly pointed up our lack of anything concrete concerning the psychological aspects of cardiovascular disease and disability. I

believe there are many areas where research in cardiovascular rehabilitation could be productively pursued. Two areas seem particularly important: First, we need to know what the rehabilitation potentials are in any given case of cardiovascular disease and how we go about determining these early in the course of the disease. Second, what services and facilities are needed to carry out the rehabilitation prescription so that the fullest potential can be realized.

Dr. Sprague: Dr. Rusk, earlier you expressed the informal opinion to Bill Dock that it might be possible to study the factors responsible for continued psychiatric disability in cardiac patients under a supervised training program at the Institute. In addition to this, I believe the collection of data from companies employing cardiacs would be of value in convincing other companies that they do not present an overwhelming employment risk. As further studies, I would suggest (1) factors responsible for the development of congestive failure in employed cardiac patients; (2) the average working life of cardiacs with different types of heart disease; (3) the actual occurrence of fatal angina pectoris or of overt coronary thrombosis during actual employment, (4) work capacity after mitral valve surgery.

Dr. Irvin: There is great need for research and development in two areas of cardiovascular rehabilitation: (1) the development of tests which will better evaluate the physical capacity of the individual and (2) research in terminology to communicate the patient evaluation to those who can use it. I am sure that you will all agree that the Heart Association's functional and therapeutic classification leaves much to be desired from the standpoint of job placement.

Dr. Chapple: Before mentioning areas where I think research could be productively pursued, I would like to say a few words about the current program in the Veterans Administration. The Veterans Administration hospitals are suited for certain types of cooperative research projects, because they are all generally quite similar, their records are uniform, and they are coordinated

in a central office. In addition, the hospitals are almost all affiliated with medical schools. In addition to the cooperative study in tuberculosis with which you are all doubtless familiar, there are several other such studies under way. One is a retrospective survey of thousands of records of patients with coronary artery disease to establish the basis for a cooperative prospective study. The evaluation of anticoagulants will be an imporant part of this. The second is a study of antihypertensive drugs. Also research into matters other than those concerned directly with diseases per se can be pursued in several fields: (1) to learn the most effective psychological techniques to assure mental health (this might be considered as much in the realm of preventive medicine as in rehabilitation); (2) to learn more about the value of bed rest and ambulation in various disease states; and (3) in an area that has not been mentioned so far, that of food acceptance. The matter of diet is becoming increasingly important in cardiac rehabilitation, and I think this is an area where we might learn a good deal by research.

Dr. Rusk: Dr. Marple, would you say a few words about the American Heart Association's interest in support of research?

Dr. Marple: The American Heart Association offers research support to investigators in the form of research fellowships, established investigatorships, career investigatorships, and grants-in-aid. Emphasis is placed on the support of the individual investigator rather than on project support because of the pressing need for recruitment and development of skilled research personnel. Support of research in the cardiovascular field is interpreted broadly, so that a high percentage of the over-all support is actually basic rather than applied research.

The national research program is augmented by the independent programs of support by local heart associations. The association is contributing financially and otherwise to the support of several projects which relate to the rehabilitation of the cardiac patient. One such study is the Iowa study of the effects of farm work on the patient with heart disease; another is the Purdue study on the physiological demands of various occupa-

tions and tasks, which Dr. Morris has mentioned today; a third is the pilot program on vocational guidance for cardiac patients being conducted in New York City by the Vocational Advisory Service.

The Committee on Strain and Trauma is engaged primarily in the sponsorship and supervision of two specific projects. The first of these, concerned with the clinicopathological aspects of heart disease, is a study of the occurrence of heart disease and especially of coronary artery disease among persons dying suddenly. The second, concerned with the medicolegal, insurance, and industrial aspects of heart disease, is a comprehensive national survey of legal and compensation experience with cases of cardiovascular disease. The general purpose of these studies is to obtain objective information as a basis for better understanding of cardiovascular disease in relation to compensation and legal medicine.

Dr. Rusk: In what areas do you think research might be productively pursued in the future, Dr. Marple?

Dr. Marple: I believe basic research is necessary for ultimate success. It must involve a broad spectrum of disciplines ranging from physiology and biochemistry through psychology and psychiatry into the socioeconomic areas. Basic knowledge is most [illegible]

Dr. Rusk: Dr. Hilleboe, what are your thoughts on this matter of research?

Dr. Hilleboe: I have been giving some thought to research projects in cardiovascular disease and rehabilitation. There are two that I would like very much to see accomplished. First, it would be highly desirable, as Dr. Gerber suggested earlier, to do some evaluation of a work classification unit. At the present time, so many of the activities in these units are purely on a sub-

jective basis. I would like to see to some measure the results accomplished with a group of patients who have been properly diagnosed and go through a clinic and another group who have been properly diagnosed and who do not have the advantage of the unit approach. I do not think it would be too difficult to work out a project design for such a study. For example, in Buffalo we have a work classification unit being developed in our Chronic Disease Research Institute. I am sure Dr. Rodbard, the director, would be interested in making such a study if funds and personnel were available. If you think this sort of thing might be of value, I could ask some of the group to work out a project design including cost and personnel needed during the time of study, which could certainly be under 2 years if a sufficient number of patients could be seen.

The second study I would like to see performed would be of the type we are now doing at the West Haverstraw Hospital. As I told you, about 20 per cent of the patients who are on the aid-to-the-totally-and-permanently-disabled rolls are cardiac patients. As of May, 1956, there were 40,000 people on these rolls and the cost is now something in the neighborhood of 40 million dollars a year. Twenty per cent of this is still quite a considerable number of people and a considerable amount of money. Again, I think we could take a random sample of the patients in this group and see what might be done with those who come through the rehabilitation service at West Haverstraw and compare them with an equal and similar number who do not go through a rehabilitation program If you think additional funds could be obtained from one of the public or private agencies, I am sure our group could develop the project design necessary.

Dr. Feldman: In addition to the study of the rehabilitation potential of a number of cardiac patients from the permanently disabled roles, I would like to see a study of the effects of disability and rehabilitation upon the psychological, social, and economic aspects of the family unit of a number of these same individuals. This might also be done on a group from private practice, a large municipal cardiac clinic, and a work classification unit. We are hoping to make such a study on a group of

patients who have had a stroke and who are admitted to Bellevue Hospital. This is to be part of a long-term multidisciplinary study of the problems of the patient with cerebrovascular disease which we hope to carry out with both the medical and neurological services. Research could also profitably be done on the physiological and psychological components of the restorative process in patients with cerebrovascular disease.

Dr. Rusk: Dr. Ferree, do you have some suggestions?

Dr. Ferree: I would suggest that the following have importance as far as research is concerned. (1) study through conference methods of ways in which a more uniform approach can be achieved to provide expert opinions in compensation cases involving cardiovascular disease; (2) research and administrative methods for improving the process of selective placement of cardiac patients; (3) study of attitudes and experiences relating to the employment of cardiac patients; (4) studies on utilization of the work capacities of those who cannot compete in gainful employment through facilities and services of sheltered workshops, rehabilitation centers, etc; (5) basic clinical and operational or administrative research by the various work classification units.

Dr. Lee: At a meeting of the work classification unit personnel in New York in October, 1954, a list of nine basic problems were defined which would warrant study in the various work classification units. Although some of these have already been mentioned, you might be interested in the whole list, which was as follows: (1) What factors determine the employability of persons with heart disease? (2) What type of work can persons with heart disease perform? (3) What effect does occupation have on the course of heart disease? (4) What effect does the development of heart disease have on occupation? (5) What stresses of particular jobs are poorly tolerated by persons with heart disease as compared with persons without heart disease? (6) How great is the risk of continued employment of known cardiac patients? (7) How soon can the person who has had a

myocardial infarction return to work? (8) How evaluate the fitness of the persons with heart disease by history, physiological studies, on-the-job performance? Other factors? Combination of factors? (9) How predictable is the future of the employed individual with heart disease?

Dr. Rusk: Dr. Holman, in what direction do you think our future research efforts should go?

Dr. Holman: It seems to me we need to realize more clearly than we do now that we are only beginning to accumulate information about the cardiovascular diseases from beginnings through their entire natural course to termination. The major portion of their course is chronic and in most instances benign and ambulatory. For the most part it proceeds without medical observation or advice. Important follow-up studies of selected groups of patients are beginning to appear. From those dealing with degenerative cardiovascular disease, we learn for instance that most individuals live long periods, deteriorate, and finally terminate in a steplike crisis followed by vascular accidents in one anatomical location or another A minority deteriorate gradually. We know next to nothing of the reasons in either group, and especially important is the fact that so little attention has been paid to correlating external environmental factors. Some reported studies on the effects of pregnancy upon rheumatic heart disease are a step in the right direction I have gone into detail to illustrate the direction I believe research should follow. I believe there should be concerted, carefully planned and documented follow-up studies relating course of disease to total environment Patients registered in such a program can be proper subjects for physiologic research, since much objective clinical information is needed. However, in my opinion, energy costs can only be estimated qualitatively, never quantitatively, and if total energy costs could be estimated accurately, which we doubt, it still would not provide the answer to the basic problem. The human machine is exceedingly complex. In dealing intelligently with it, there is not likely ever to be a substitute for clinical judgment based on knowledge and experience.

Dr. Rusk: We have heard primarily about research projects directed towards solving the problems of the working adult cardiac. I wonder if Dr. Gordon Williams or Dr. Harrison Wood has any comment about adolescent or child cardiacs?

Dr. Wood: There are two areas in this category of cardiovascular rehabilitation where I think research could be productively pursued. The first is that of adolescents with advanced rheumatic heart disease. These young people, some of whom are not candidates for cardiovascular surgery, are faced with great problems of occupation and social adjustment. I feel that a pilot study on a group of such adolescent rheumatic cardiacs might be an extremely valuable undertaking The second area of research which I think would be valuable is essentially one of epidemiology. This is to some extent being carried out in some of the medical schools and research institutes in this country, for example, control studies of prophylaxis of children who have had rheumatic fever and studies on the epidemiology of atherosclerosis. Such fundamental studies will certainly in the long run contribute to the field of rehabilitation of patients with cardiovascular disease.

Dr. Gordon Williams: I feel that there is at the present time far too much confusion with respect to the physical fitness of children with heart impairment This, as you know, has created in some instances a group of youngsters who are isolated from normal childhood experiences with their peers. The result in terms of healthy development for such a child can be most unfortunate. A program of physical restriction applied by a physician to a child with congenital or acquired heart disease is often prescribed on a rather arbitrary basis. When one considers these children in terms of their later achieving as adults positions as productive members of society, it would seem clear that we need objective criteria by which we can adequately make a physical evaluation which we can use to counsel and guide them in school and in prevocational planning I should then visualize a research project that would furnish information needed by both physicians and educators, an objective study of the work tolerance of chil-

dren with congenital and acquired heart disease, to be carried out along the lines that Dr. Greer, Dr. Hellerstein, Dr. Morris, and Dr. Stewart have done in industrial and agricultural situations. Such a study, were it to be undertaken, should be done in a normal school setting, and it should attempt to define the capability of children with various types and grades of heart disease to perform normal classroom and play activities. As you know, a study has already been undertaken in the New York schools to examine the attitudes of children with rheumatic heart disease towards placement in special "health classes" and to analyze the teaching programs offered such children. This study has demonstrated that an alarming number of these children have unhealthy, emotional attitudes towards themselves which are probably related to their having been displaced from a normal social situation

The physiological work study which I propose should be correlated with a careful psychologic and psychiatric study of the same group. Ideally, if the study were done in a secondary school setting, the research team should also include a vocational counselor who could experiment with techniques of guiding children with such impairments towards realistic job training. I realize that a project of this sort that I have outlined would be expensive and time-consuming. To be truly worthwhile, it would require years of follow-up of the subjects of the investigation after they have reached adult life. Nevertheless, if it were possible to arrive at some definitive answers to questions where the answers are now most poorly defined, assuming that the results of the study were properly publicized, it should be in a long-term sense economically valid. If it accomplished nothing more than to reduce the anxiety which is found in ignorance, in the child, his parents, and his physician, it should be worthwhile.

A second study of a more restricted nature which I would like to see done has to do with children with congenital heart disease who have undergone surgical procedures. There is a growing number of children who 10 years ago would have had a very limited life expectancy and would have been totally dependent members of society, who are now being salvaged surgically. It is to be anticipated that these children will be going out to make

their own ways as productive members of society. I feel that it would be most interesting to determine for this group the type of job placement which would be most satisfactory. I am not aware of any investigation which is now being done along these lines on children with postsurgical congenital cardiovascular histories.

Dr. Dacso: Very little mention has been made of research in rehabilitation of patients with cerebrovascular disease, particularly those with so-called "strokes." There is so much we need to learn about this, but I will only mention the problems of hemiplegic pain and its effect on rehabilitation, the influence of specific rehabilitation procedures on the motor recovery pattern, and the influence of age on the end results of rehabilitation.

Dr. Rusk: Dr. Caughey, do you have a suggestion?

Dr. Caughey: I believe support should be given to research on medical education in health services, aimed at giving medical students, recent graduates, and practicing physicians more constructive attitudes towards patients with chronic disability and more skill in mobilizing, in behalf of cardiac patients, the resources of other professions and of community agencies.

Dr. Rusk: Dr. Levy, would you say a final word?

Dr. Levy: The thing which has stood out most vividly in all our discussions today has been the need for both basic and clinical research in the domain of cardiac rehabilitation. The whole subject needs reorientation in order that the approach may be both scientific and effective. Up to now, the attack has not been well coordinated. I hope this meeting may help to focus attention on some of the more urgent problems.

Dr. Rusk: Thank you, ladies and gentlemen.

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